

October

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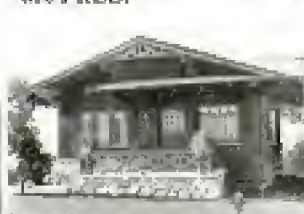
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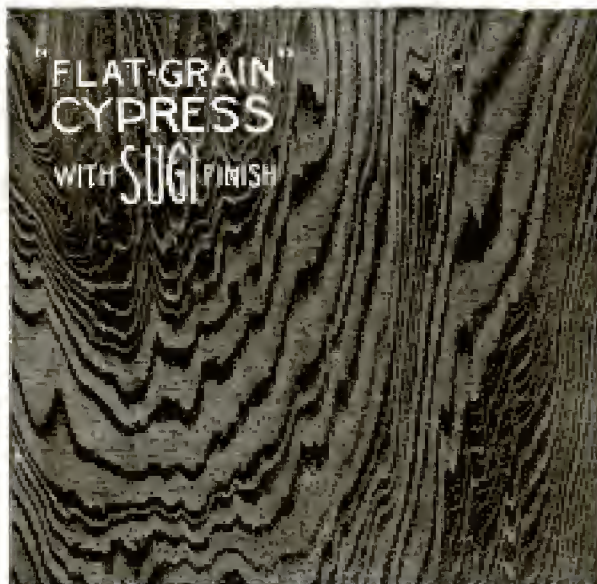
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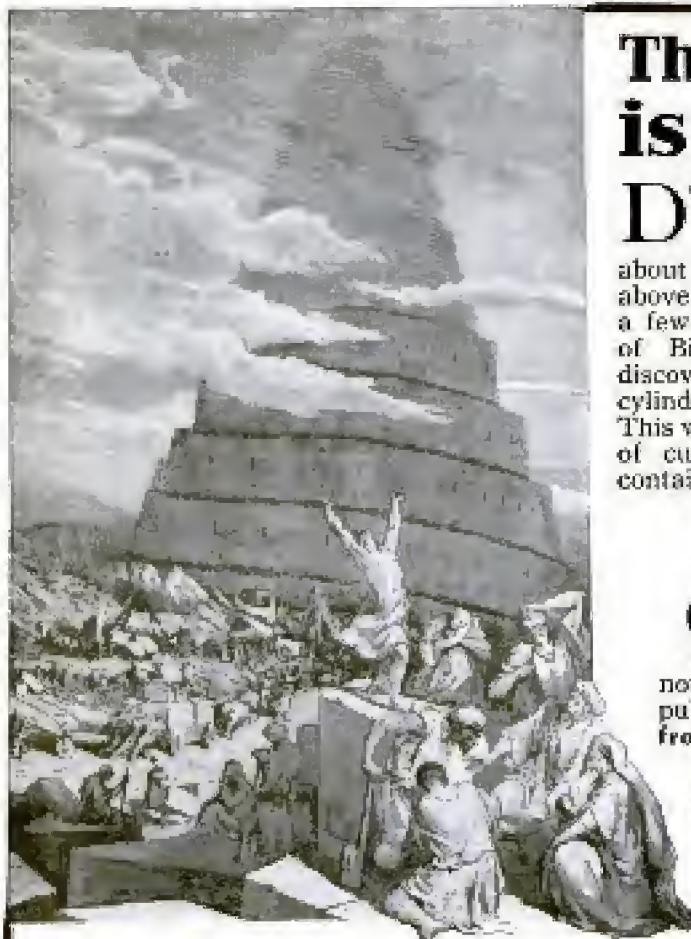
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The Tower of Babel is Still Standing

DO you realize that 4000 years after this most wonderful of all towers was built by the ancients (according to the Book of Genesis about 2400 B. C.) its seven stages still rise high above the plains near the site of Babylon? Until a few years ago it had been known as the Mound of Birs Nimrud when Sir Henry Rawlinson discovered in one of the stages the inscribed cylinders which made the identification possible. This wonderful account is but one of the thousands of curiously interesting records and documents contained in the great work—

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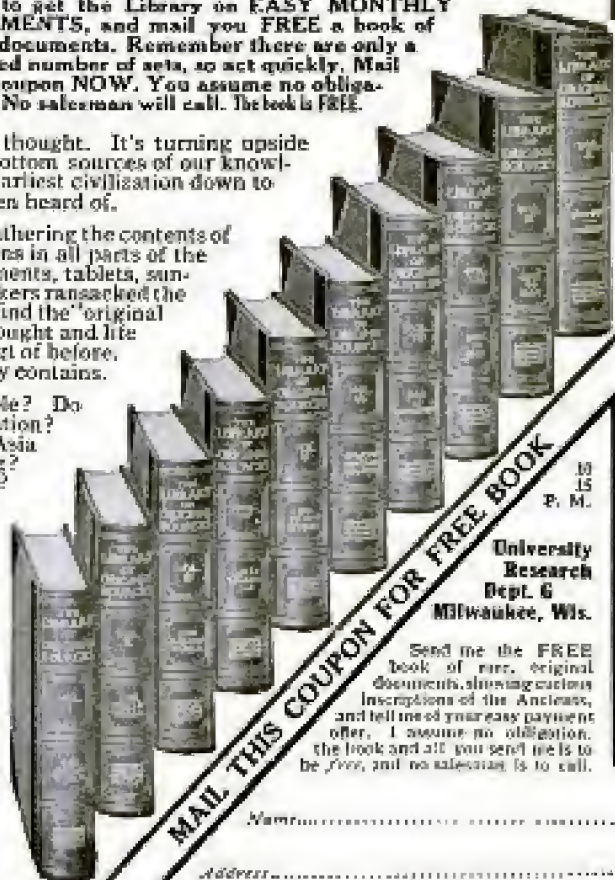
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How to handle the mind in Creative Thinking.
The secret of Building Mind Power.
How the Will is made to act.
How to test your Will.
How a Strong Will is Master of Mind.
What creates Human Power.
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Definite Methods for developing Will.
The NINETY-NINE METHODS for using Will-Power in the Conduct of Life.
Seven Principles of Drill in Mental, Physical, Personal Power.
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How to develop a strong, keen gaze.
How to concentrate the eye upon what is before you—object, person, printed page, work.
The First Principles for Success in contact with others.
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How to open the mind and body for reception of incoming power.
The fifty-four Master rules in the control of others.
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How to overcome the tyranny of the Nerves.
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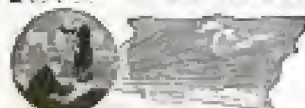
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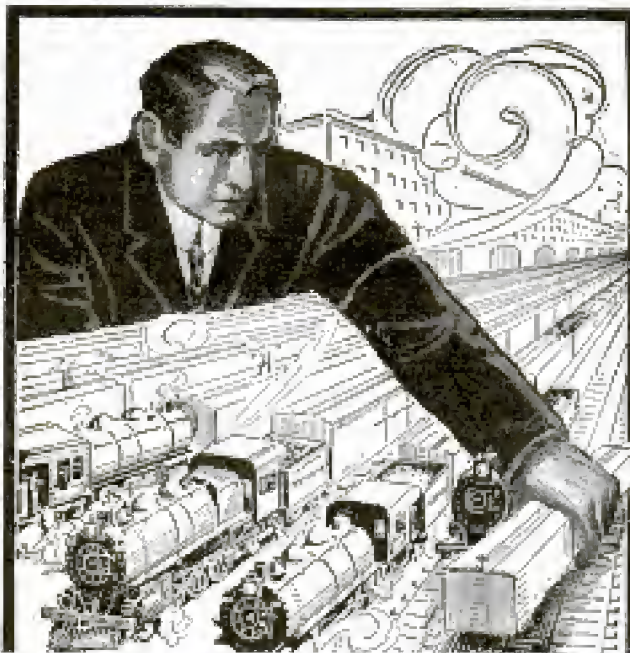
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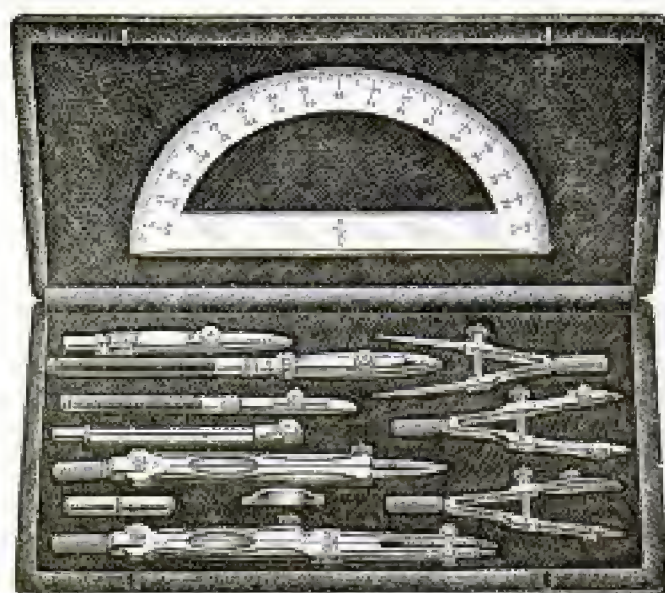
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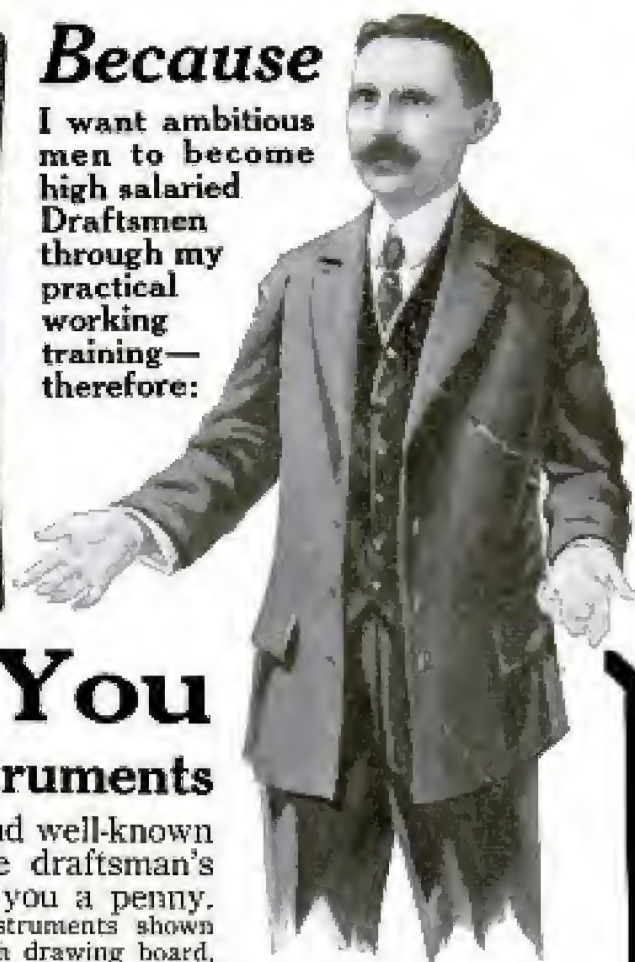
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21 BIG Manufacturing Opportunities open to you. Start at home. Spare time. Capital unnecessary. Complete formulas and instructions sent for dime. Gem Co., 3014 Brook Louisville, Ky.

WE start you in the mail order business and show you how to succeed; attractive 64-page catalogue of 300 novelties with your imprint; exceedingly reasonable; all goods wholesale. Send for my plan and particulars. Cunningham Co., Stamford, Conn.

BE your own manufacturer by sending 25 cents (cash) for 100 good commercial formulas. All good sellers. Conewango Manufacturing Co., Box 1106, Warren, Pa.

MEN—Learn to make my sparkling chipped glass name plates, house numbers, signs, etc.; make \$15 a day; write for my big free 32-page book, 45 fine illustrations, etc.; tells how. E. E. Palmer, Worcester, Ohio.

WANT Big Profits? Learn Tactile Mirror Silvering. Now process opens enormously profitable business. Particulars free. B. Barnow, 514 23rd Street, Oakland, Calif.

HERB Recipe Book and Herb Catalogue. 16c. Teaches how to make medicine from herbs for all diseases. Herb Gardens, Dept. 44, Hammond, Ind.

RECEIVE a \$5,000 business in two years. Let us start you in the collection business. No capital needed; big field. We teach secrets of collecting money; refer business to you. Write today for Free Pointers and new plan. American Collection Service, 101 State Street, Detroit, Mich.

"DOLLARS" yearly in your back yard. No plugging, mushroom dope. New ideas never before published, particulars free. Metz, M., 313 East 89th St., New York.

INVENTORS: We develop and perfect inventions, make models, dies, tools. Metal stamping and special manufacturing. Gerding Bros., Lion Bldg., Cincinnati, O.

START in the Carpet or Clothes Cleaning Business Now. Thurman Vacuum Process unequalled for commercial cleaning. We show you how. Easily learned. Only \$125 capital needed to earn good income in towns of 2,000 and over. Write today. Thurman Vacuum Cleaner Co., manufacturers all types Vacuum Cleaners, Dept. B, 84, Leola, U. S. A.

SAN-O-TEX, sanitary, fireproof floors for kitchens, pantries, theatres, hospitals, etc. Learn how to mix and spread and have an income of \$150 to \$300 monthly from kitchen floors alone. Instructions \$3. San-o-tex Company, Mechanic Street, Washington, Indiana.

INVENTIONS commercialized on cash and royalty basis. Inventors, manufacturers and agents write: Adam Fisher Mfg. Co., 61 Fisher Bldg., St. Louis, Mo.

MAKE Big Money Opening Safes and Setting Combinations. Wayne Strong, Box 1470, Los Angeles, Cal.

MEN and women for easy business. No interference with present position. Great money. Free information. F. Leonard Eager, Waterbury, Conn.

WOULD you like to own a good-paying Mail-Order Business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own. Particulars free. Nadco, 4413 Lincoln Ave., Chicago.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Relations and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste material, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

PATENTABLE ideas wanted—Send for 3 free books. R. R. Owen, 39 Owen Bldg., Washington, D. C.

WRITE Moving-Picture Plays. Good prices. Devote all or spare time. No correspondence school. Details free. Atlas Publishing Co., 3046, Cincinnati.

ADVERTISERS, Mail Dealers: Our 1915 Rate Book lists 2,500 Principal Publications, rates, circulation. Includes 25 Mail-Order Plans. Price 15c. Dealers Advertising Agency, 216 Franklin Bldg., Chicago.

LEARN the Real Estate Business. Our complete instruction book teaches: Listing, Appraising, Management, Salesmanship, Insurance, Brokerage, Advertising, Renting Agency, Forms, etc. 121 subjects. Booklets \$25.00 correspondence course. Buckeye course, 75c. Silk cloth \$1.00 postpaid. Realty Book Company, 3087 Euclid Ave., Cleveland, Ohio.

LET the parcels post help you. Add \$15 to \$25 weekly to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address: Frase Mfg. Co., Inc., Dept. A, 70 Broadway, Buffalo, N. Y.

How to Operate a Mail Order Business. 30 Big Profit Plans and year's mailing service sent for 10c. Mail Dealers' Wholesale House, 321 Franklin Bldg., Chicago.

BE Wise. Don't experiment in mail order. I can tell you how to succeed. B. Barnham, Waukegan, Ill.

MANUFACTURERS, Promoters and Patent Buyers are invited to write us stating the line of invention in which they are interested, as we can supply their wants in our class of patents. Victor J. Evans & Co., 162 Ninth St., Washington, D. C.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Yours, Desk C. R., Omaha, Neb.

LEARN to collect money. Good income; quick results. Send for free booklet, "Skillful Collecting." Collectors' Association, Long Street, Newark, Ohio.

I WANT to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. F. W. Johnson, Classified Dept., Popular Mechanics Magazine, 6 N. Michigan Ave., Chicago.

PARTNERS WANTED

ADVERTISEES holding guarantee of patentability U. S. A. for Improved Electric Plug, desires immediate partner to finance patent fees. Half interest given. M. M., 9th Fl., 75 E. Madison St., Chicago.

BUSINESS FOR SALE

FOR SALE—Tire and Vulcanizing Business in Live Town. Will Show Fine Profit. Owner Leaving City. For Particulars Address H. H. Trebel, 310 Market Street, Hamilton, Ohio.

MAIL ORDER SUPPLIES

SELL Joker's Novelties! 16 samples, 10c. Chambers Works, Plainwell, Mich.

INCREASE your sales. Place your proposition before the readers of "Cartoons Magazine." 20,000 copies guaranteed every month. Classified rate 2c per word. Mail in a trial ad today. Cartoons Classified Dept., 78 E. Madison St., Chicago.

DUPLICATORS AND DEVICES

MALAIANE Junior Duplicator \$1 postpaid. Has 2 duplicating pads 3 1/2 inches each. Ask booklet, Malaiane, 1705 Southern Boulevard, New York.

MAKE your own duplicator for a few cents. Will list later. Send 2c stamp for particulars. Desk 3, 504 Robinson Bldg., Racine, Wis.

GUIN "Modern" Duplicator—Yours for \$2.40. No Glue or Gelatin. Always ready. All sizes. Free trial. \$4,000 users. Standard for 15 years. Booklet free. Sole mfrs., J. E. Durkin & Heeres Co., 339 Fifth Ave., Pittsburgh, Pa.

FOR ADVERTISERS

ADVERTISE! Twenty words in 100 monthlies, \$1.00. Sample Magazine Free. Stanford Agency, Selma, Ohio.

YOUR fifteen word advertisement in our \$12 magazine, reaching 20,000 boys, for 25c. Extra words 1c each. Your's Magazine, Chicago.

BARGAIN—20-word ad, one insertion, 25,000 circulation and one year subscription, 25c; extra words, 1c. Digest, Grand Rapids, Mich.

YOUR advertisements placed in 20 different magazines for 3c per word; displayed, \$1.50 per inch; three times for price of two. List, particulars free, King's Magazine, Box 13-F, Little Silver, N. J.

PERSONAL

BROTHER—Accidentally discovered root cause tobacco habit. Gladly send particulars. P. Stokes, Melrose, Florida.

FREE—Stop using Tobacco. Free. We will give free information how to conquer the habit easily and permanently. Results Guaranteed. Anti-Tobacco League, 618 Paxson Block, Omaha, Neb.

AGENTS WANTED

AGENTS—Send for Free Sample "Fret-not." Enough for one washing. Be convinced you can do a whitening business. You can clear at least \$20 to \$100 weekly, according to spare or whole time. We want only the agents and give exclusive territory to men who can produce. You don't have to talk. If she doesn't buy at sight leave a sample. She will be looking for you long before you are able to make the rounds again. Free premiums for your customers. Our proposition is such a result getter that we can afford to give you all the samples you need. Credit given. Particulars free. Don't call. P. M. Mottet & Sons, 3215 Warren Ave., Chicago.

AGENTS—Snapshots household line on earth. Red hot sellers, steady repeaters. 100% profit. 250 light weight, fast selling, popular priced necessities. Agent's outfit free. Get busy—quick. Write today, postal will do. American Products Co., 5918 American Building, Cincinnati, O.

ESTABLISH yourself for life as a branch manager. With character and brains you need no capital if you act now. Everywhere in your city really marble is ruined for lack of proper cleaners. From from all acid, grail, grease, "Marblestone" is a revelation; cleansers, effluvia, enriches granite, mays, porcelain, tiles, enamel, metal wood-work. Houses, churches, stores, banks, hotels, office buildings, garages. You also can take big cleaning contracts. Write immediately for full particulars. A. Ryan, American Marble Cleaning Co., 136 E. 56th, New York.

AGENTS and Salesmen—"Cartoonists" Magazine, 48-page monthly, chock full of valuable information for cartoonists and salesmen; tells how to buy from manufacturers, illustrates newly patented specialties, exposes "fakes," mail order schemes, and tells a hundred and one things hustling salesmen should know. Yearly subscription, \$1.00; special limited time rate, three months, 50c; six months, 25c. (No free copies.) "Cartoonists" Magazine, Dept. D, South Whittier, Indiana.

EVERY household on Terra, in small town or suburbs, where all lamps are used, needs and will buy the wonderful Aladdin Mantle Lamp. Burns common coal oil (Kerosene); gives a light five times as bright as electric. Awarded gold medal at San Francisco Exposition. One farmer cleared over \$500.00 in six weeks; hundreds with rigs earning \$100.00 to \$200.00 per month. No cash required. We furnish capital to reliable men. Write quick for wholesale prices, territory and sample lamp for free trial. Address nearest office: Mantle Lamp Co., 517 Aladdin Bldg., Chicago, Ill. Mantle Lamp Co., 517 Thomas Bldg., New York City.

AGENTS—Call on best people. Fast seller making you \$2.00 on every sale. Send for particulars, Smith Mfg. Co., Bristol, Conn.

MEN and Women Agents: Money talks—how much are you making? If you are earning less than \$200 a month, no matter what your locality, you will positively be delighted with our Scintillating Alarm proposition. Many agents easily earn \$15.00 daily. Brand new invention. Sells quickly on sight to homes, offices. Patented. No competition. Free exclusive territory. Instantly attached any door knob. Impossible turn knob without ringing bell. No batteries, screws, nails. Handsomely nickel-plated. Retail \$1.00. Provides cheap burglar insurance. It's a big money maker. Let us prove why. If you mean business write today for liberal terms to agents. Marshall Robbins & Co., Manufacturers, 1422 Marquette Bldg., Chicago.

WRITE quick. New, big paying territory just open. Take orders for guaranteed Planto Silk Hosiery and made-to-measure underwear. No capital or experience necessary. We teach you free. We pay all express. Big money and permanent business for men and women who write at once. Malloch Knitting Mills, Dept. 1497, Grand Rapids, Mich.

AGENTS wanted to sell back-saw blade cases in every factory and shop. Send list for sample. C. G. Pliska & Co., Whitehall, Mich.

ACCEPT no agency until getting offer on Ho-Ho-Co Skin and Scalp Soap and Toilet Articles. Our plan new and different. Territory limited. Write today. Kothan, 212 N. 2nd, St. Louis, Mo.

AGENTS—Get particulars of the best Self-Heating Iron on the market. Low in price—absolutely practical. Three sales a day mean \$40 a week profit to you. Send postal today. C. Brown Mfg. Co., 4290 Brown Bldg., Cincinnati, O.

YOU can make big profits selling our Pure Aluminum Kitchen Utensils—Guaranteed for 20 years. Our specialties are not sold in stores, and they get the business for you. \$200,000 firm and liberal credit plan back you. We have an attractive General Agency offer. Wm. J. Dick, Manager, Dept. B-21, 20 W. Lake St., Chicago.

LIVE Agents—Strike big money. Particulars free. Sumner Co., D-3416, Augusta, Ga., Chicago.

AGENTS earn money on Bid-of-Itals. Other big sellers. Borg & Beard, Inc., 81 Fleet Place, Brooklyn, N. Y.

WANTED—Agents to sell our Home Altar; great seller to Catholics. Inquire proposition. Novelty Altar Co., Stamford, Conn.

AGENTS are making money selling our big 10c Packages of 20 Assorted Postal Cards, "5,000 Varieties." "Big Profits." Sell everywhere at sight. Sample Packages 10c. Particulars Free, Sullivan Card Co., 134 Van Buren St., Chicago, Ill.

GET Money—I did; got \$301.25 in two weeks doing plating, writes M. J. Smith of Pennsylvania (used small outfit); start as Smith did; that's easy; hundreds already started, money coming in, goods going out. People everywhere have tableware, watches, jewelry, etc., for the "Gray Plating Man." Practical outfit, all sizes, heavy plate guaranteed. Pure Gold, Silver, Nickel. Metal plating, latest process taught free quickly; experience unnecessary; secrets exposed. Own and lose a business that pays \$15 to \$30 weekly—you can. Write today. Gray & Co. Plating Works, 442 Gray Bldg., Cincinnati, O.

MAGIC Ink Eraser. No blade or acid. Removes ink like magic. Sells 25c. Sample 10c. Sell like bread in a famine. Fountain Pens, Aluminum Milk Bottle Covers, Gilding Casters and many agents' specialties. \$5 paid for each new agent whose established orders amount to \$25. Quick selling specialties. Who knows good agent? S. Mfg. Co., Warren St., N. Y.

AGENTS—100% profit selling new Easy Wringer Mop. Every home buys. Martin sold 180 in 2 days. One man orders \$2,650 one month. Get details. U. S. Mop Co., 310 Main St., Toledo, Ohio.

I PROMISE any man or woman who will go out tomorrow and call at ten houses, at least two sales, which net \$1.00 apiece. Ten calls—\$5.00 for your day's work. It's that aluminum combination set that you are to offer—aluminum the women are crazy for, and at a price they go wild over. Experience in selling or not—doesn't matter. Drop a card and let me post you on my \$2.00 a day offer. Manager, Perfection Products, 1422 Westmoreland St., Philadelphia.

PORTERAIT Agents: Our goods will make you big profits. Delivery guaranteed. Refunds credited. Prompt shipments. Low prices. Send for latest catalogue and prices. Adam J. Kroll & Co., 602 Illinois Island Ave., Chicago, Ill.

AGENTS with selling experience to sell direct to consumer, made-to-measure suits and overcoats, \$12.50 and \$15.50. If you want an independent business with big money, answer at once before territory is taken. Elegant outfits furnished. Midland Tailoring Co., 19 S. Fifth Ave., Chicago.

AGENTS—Men and women, newest invention. Wing Self Heating Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1828 Fulton St., Chicago.

MARVELLOUS—Expanding Cuff Button. New invention. Slip your cuffs up or down forearm without unbuttoning. Positively stay where you place them. Reduces laundry bills, easiness utility with convenience. Practical. Agents earn money—season now ready. Embraced everywhere. Exclusive territory. Public demands them. 100 per cent profit. Fill a positive want. Enclose stamps for full particulars. Flexo Cuff Links Co., Shakerago, Wis.

AGENTS—Made to Measure Haincoats. Free cost, big commissions to good agents. Temple Haincoat Co., Box 400, Templeton, Mass.

TAILORING Agents Wanted. If \$10 to \$30 a week for your spare time interests you, write us quick for beautiful new sample outfit, 60 ditty fabrics, 32 swell styles, wholesale prices, measuring chart, tape line, etc., all free to you by return parcel post. We pay express charges and guarantee satisfaction on all our clothes. Your own suit special to show your friends, made to your measure and the finest you ever saw; new, ditty, stylish and first-class in every way. Write us quick. Even if you can't be our agent, get our proposition on a suit for yourself. Paragon Tailoring Company, Box 1014, Chicago.

DEPARTMENT Stores, jobber agents making money selling our high-grade magnifying glasses. Send for circular. Christian Schiller Mfg. Co., 12 Bloomingdale Street, Rochester, N. Y.

AGENTS wanted to sell Non-Alcoholic Food Flavors, Perfumes, Toilet Articles, Soaps, Soft Drink Extracts, Household Necessities. 8-10% selling to consumer. Big profits to Agent. Sample free. Credits given. Arthur S. Christ & Co., Dept. S, Newark, New York.

I WILL start you in mail order business if you handle my goods. Crest Co., 50 Atlantic City, N. J.

SOMETHING every man needs. Write Chas. Milton Co., Hermosa Beach, Calif.

MAKE and sell your own goods. Farmhouse by expert chemists. Manufacturing processes and trade secrets. Formula Catalog for stamp. B. Mystic Company, Washington, D. C.

AGENTS wishing to earn more money and for my catalogue of repeat order articles; particulars free. H. O. Abel, Box 184, Hanover, Pa.

TIGER BRAND Government Jobs Open to Men and Women, \$45.00 to \$150.00 month. Write for list, Franklin Institute, Dept. B-22, Rochester, N. Y.

AGENTS—Here's a money maker. New, low-price Portable Oil Gas Stove, light in weight, compact, practical. Every home a possible customer. Cooks, bakes, heats. Sells both in summer and winter. Write today for our Money Making Proposition. The World Mfg. Co., 6309 World Bldg., Cincinnati, O.

AGENTS—100% commission. Latest Auto Specialty. Every motorist a customer. Dept. P, Chase Specialty Company, Box 237, San Antonio, Texas.

GET in the \$75.00 a week class; our proposition will get you started right. One man made \$500.00 in one week. Study Agency, Peckville, Penn.

GREATEST Check-protector with four disk necessities. Sample free. Sells \$1. Valuers, 201 Broadway, New York.

HEATLESS Trousers Press—Sells at 50c or \$1.00. Guaranteed to press trousers in 5 minutes without heat or iron. Big profits. Patented Goods Co., Dept. P, 5 Liberty St., Poughkeepsie, N. Y.

\$61.50 WEEKLY Introducing and selling a new gas light burner for kerosene lamps. Beautiful light. No chimney. No trouble. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. Will last for years. Low price. Easy to sell. 200 per cent profit. Experience not necessary. Sample free. Why not try one on your lamp? Beware of imitations. No branch offices. Lumber Manufacturing Co., Dept. 104, Cincinnati, Ohio.

Big Textile Mills will employ everywhere reliable people to take orders for dress fabrics, hosiery, underwear, sweaters, waists and skirts from samples. Factory prices. Space or all time. No experience. Permanent. Many making over \$30.00 weekly. Standard Mills, 20 Reuben St., Cohoes, N. Y.

THREE Experts coin money. Send name for particulars. F.H.S. Wilmette, Ill.

AGENTS, get propositions of all kinds. Send for Registration, Atlanta Service Bureau, 1579 Mack Ave., Detroit, Mich.

\$1.00 EVERY hour. Easiest seller ever offered. McLachlan writes: "Week's profit is \$22." Write today. Empire Supply Co., Niagara Falls, N. Y.

ENERGETIC man can make time to bring in dollars daily selling our unsurpassed line of new specialties. Write today to Sales Manager, Box 418, Quincy, Ill.

AGENTS, both sexes, for Gem Wall Clothes Drier, Big Profits, F. J. Mathies, 1212 Park Place, Brooklyn, N. Y.

ATTENTION! Clear \$30.00 weekly your round making music evenings. Why look farther? Send list for facts, price and elegant new music to Walther Music Company, Boston, Massachusetts.

"JIFFY" Dupliator, \$3.00, Prints 1,000 postcards, etc.; 50% to agents. E. N. Fales, Chicago.

REAL live agents to start now selling Star and Handy Clothes Line Berls. Quick sellers. Big profits. Particulars free. Feeny Mfg. Co., C-192, Muncie, Ind.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo Plates, Pennants. Refects credited. Prompt Shipments; samples and catalogue free to agents. 30 days' credit. Jas. C. Bailey Co., Desk B-4, Chicago.

AGENTS Wanted—To advertise our goods by distributing free sample to consumers. 50 cents an hour. Write for full particulars. Thomas Mfg. Co., 562 North St., Dayton, O.

LARGEST money-maker out. Newly invented "Linedefiner and Copy Holder" for stenographers. Greatest time saver. Exclusive territory. Lingnald Mfg. Co., 180 N. 5th Ave., Chicago.

Big money made installing alarm clock supports to control drafts on steam, hot water, hot air and natural gas heating units. Warm house in the morning. Use your own clock. Price, \$2.50. Alroy Mfg. Co., 1234 Harvard, Washington, D. C.

AGENTS for Silver polish; polishes like silver or plate a minute. No rubbing. Very large profits; good reseller. Excellent side line. The Mahet Company, Newark, N. J.

MAKE your own Extracts and Perfumes. H. Lake Co., Adair, Ill.

AGENTS—Make money quick, easy, sure. Introducing our line of Coffee and Tea. You should make from \$10 to \$15 daily. Write for our selling plan. D. Abbott Coffee Company, Lynchburg, Va.

TWO cents sets proposition on Goodrich Rubber Telephone Ear Cushions. Every phone user a prospect. Effectually excludes all outside noises. Full outfit for \$25 cents (returnable) and book on antisoundship. 100 to 150%. Frames Co., Majestic Bldg., Detroit, Mich.

200% PROFIT. You can't beat it. Sells everywhere. Free pocket sample. Our goods get the orders. Wm. J. Dick, Mgr., Dept. B-4, 20 W. Lake St., Chicago.

AGENTS—Just out. New Dollar Winner. "Wilson" One Hand Speed Wrench. Machineists, autoists, farmers, everybody, buys at sight. 100% profit. Make \$20 to \$50 weekly. Toledo Speed Wrench Co., Dept. 11, Toledo, Ohio.

GENERAL Agents Wanted in each locality to see the trade and put out agents on a new patented device for indicating tires and registering air pressure. Motorists buy on sight, as its use guarantees greater mileage. Popular prices; three sizes. If you are willing to work hard you can make big money. First man that can measure up gets the agency—write now. Hansen Mfg. Co., 1213 Illuminating Bldg., Cleveland, Ohio.

AGENTS—Here is an article of merit. A patented ventilator for home, office and public buildings. Instantly installed without tools and adjusts to fit any window. Unlimited market. The Chapman Brothers Co., Box 20, Saratoga, Conn.

VACUUM Cleaner Men: You all know Dugro. Biggest Vacuum factory in world. Best and latest models. All sizes. Blue bird indoor and outdoor clothes reels. Lowest factory prices. Dugro Mfg. Co., Warsaw, Indiana.

AGENTS Wanted—Agents make 500 per cent profit selling "Novelty Sign Cards." Merchants buy 10 to 120 on sight. 800 varieties. Catalogue free. Sullivan Co., 1234 Van Buren St., Chicago, Ill.

YOU can make big money selling electrical diamonds for the holidays. Send 10 cents for samples of scarves or ring. Our catalogue is a winner. Send for it. Loan Wilder & Sons, 539 Broadway, New York.

AGENTS—Large Manufacturer wants reliable men, women, to sell guaranteed Hosiery, Underwear, Shirts, direct to homes. Write for free samples. Madison Mills, 553 Broadway, New York.

AGENTS—Steady Income. Large manufacturer of Handkerchiefs and Dress Goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Whole or spare time. Credit given. Send for particulars. Prospect Mfg. Co., 52 Main St., Brooklyn, N. Y.

Big Money easily made selling Johns Folding Portable Electric Lamps, containing 10 ft. concealed extension cord automatically lengthened or shortened. Other features. Demonstration insures sales. Homes, Offices, Factories, Hospitals, Students. Rose Strauss Co., 215 W. 45th, N. Y.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R, Cincinnati, Ohio.

MEN and Women representatives to handle our specialties; a clean line, no trash. Seymour Specialty Company, Box 4477, Syracuse, N. Y.

AGENTS—Double your sales. Increase your profits. Let us show you the secrets of Agency Success. Particulars Free. Southwest Co., Box A1962, Los Angeles, Cal.

BLAND New Oilless Necessity. Sells seven out of ten. Profit 300 per cent. Particulars free. Sample 10c. Specialty Mfg. Co., 2 Lewis Block, Detroit, Mich.

\$10,000 FOR the inventor who can supply the ideas we need. Write for particulars. Patent News, Dept. 153, Washington, D. C.

DIAMOND Ring given for doing few hours' spare-time work. Write for particulars. Chas. Scherck, 209 So. Ottawa, Joliet, Ill.

PRACE Prosthetics. One book 1.250 \$1. Detail for \$2. War postcards, show cards, books, tracts, novelties, etc. Circulars free. Ward Pub. Co., Box 453, Chicago.

AGENTS: Everybody uses it; make \$10 per day. Particulars free. Today, 6509 E. 15th St., Kansas City, Mo.

AGENTS—Salary or commission. Greatest seller yet. Every last penny and ink boys on sight. 200 to 500 per cent profit. One agent's sales \$620 in six days; another \$32 in two hours. Monroe Mfg. Co., X-4, La Crosse, Wis.

"GOLDENE" Sign Letters—1,000% profit. Sample free. Johnston Co., Quincy, Ill.

AGENTS—Something new that automobile owners buy. Big commission. Particulars free. Louis Henry, 5824 Yocum St., West Phila., Pa.

AGENTS—Everywhere. Latest Improved Self-Heating Flat Irons and Vacuum Sweepers. Sell easily and rapidly. Profits 100%. Particulars, American Sales & Novelty Mfg. Co., 1930 Diversey Parkway, Chicago.

AGENTS—Brand new specialty Aluminum Trigonite Sauce Pan with detachable handle. Cooks 3 different foods on one burner. Saves gas. Lasts lifetime. \$100 to \$200 per month easy. Send for our catalogue of 400 other specialties. American Aluminum Mfg. Co., Div. J. 10, Lancaster, Ill.

MAN to advertise and solicit for Rogers' Guaranteed Silverware. Good salary and commission. A. A. Chase, 31 Copeland Building, Philadelphia, Pa.

I WANT agents for new proposition. Carl Miltstead, Chatsworth, Ill.

ADJUSTABLE Ventilating Shade Fixture—Every home uses it to 25. 120% profit. Demonstration sells. Mounted sample set 50c prepaid. Write today. Shade Fixture Co., Cleveland, Ohio.

SELL Slot Machine Substitutes—make pennant cards. Mann, 1207 Independence Boulevard, Chicago.

"S-O-N" means agents' easiest ten-cent seller. Inquiries not answered unless accompanied by dime for sample. Harsh Mfg. Co., Indianapolis, Ind.

500 to 1,000% PROFIT. Postcard for particulars. Summers, 514 N. Ohio Ave., Atlantic City, N. J.

\$70.00 IN Ten Days. Hedrick's profit with Rodolph's Curtain Rods. Sample, 10c. Rodolph, Manufacturer, 461 Northwestern Building, Chicago.

READ "Good Results"—Greatest Mail-Order Magazine published—two trial issues 10c. Good Results, 156-P West Washington, Chicago.

AGENTS—\$50 weekly; the only knife sharpener made on correct principle; wonderful seller; 15% profit; simple demonstration; no talking; general agents can make \$120 weekly; particulars free. 50c sample by mail, 25c. Thiele Co., 5 Austin Ave., Chicago.

YOU can make more money employing agents than by being one yourself. We show you how. We only make money when you make money. Write for particulars. Mumford & Larsons, 331 Walker Building, Salt Lake City, Utah.

ELECTRIC and non-electric changeable window signs. Lowest prices. Mandeville, 67 West Schuyler Street, Chicago, N. Y.

SAFETY Seam Ripper. Rip fast; doesn't cut the cloth. Big profits. Quick seller. Sample 45c. E. Overhill, 1205 11th St., Washington, D. C.

"DECALICO" gold sign letters better everything. New, Sensational. Humorous profits. Sample free. Williams, 40 Broadway, Brooklyn, N. Y.

AGENTS, Demonstrators: Make big money. Remarkable household specialty; great seller; astonishing success. Write quick. Empire Supply Co., Jamestown, N. Y.

10% PROFIT selling new article, repeat orders; send 25c for sample. Blackstones, 153 Main St., Brockton, Mass.

Big New York manufacturer wants ambitious representatives with at least \$15.00. Establish general agency and mail-order branch. Instructions guaranteeing success. Big reseller. Universal demand. Y. L. Moders, 24 E. 21st St., New York.

SOAP Agents—For Vegetable Soap, Toilet Goods, Remedies, Flavorings, Etc.—Outsell. Sample free. F. A. Buchanan & Co., Dept. 64, St. Louis, Mo.

AGENTS Wanted—High-grade men only. We start you in business for yourself in your own town. No capital required. New Tangent Nitrogen Lamp giving a very brilliant white light. Cuts electric bill in half. Write for restricted territories. E. Rubes Co., 239 Tenth Place, Brooklyn, N. Y.

NEW \$1.50 pocket sabbler. Sell 10 daily easy. Excellent profit. Everyone buys. No competition. K. Bassett, 3321 Indiana Ave., Chicago.

GENERAL Representatives with little capital for Jap \$200 unsinkable Gas Masher; America's latest invention; throws greater light; outlives others; substantial income assured handling sub-agents and trade. Jones, 209 W. 45th, N. Y.

AGENTS Wanted—No matter who you are, or where you live, or what you do, right now before you turn the page, before you do another thing, send us your name and address as we can send you free our beautiful, heavy sample book, crowded with wonderful bargains in men's made-to-measure clothes, all the latest fabrics, advanced styles, inside prices, measuring chart and everything needed to make \$5.00 to \$10.00 an hour in your spare time. Special offer on your own suit to advertise us. Don't miss this. We pay express and guarantee satisfaction. Send a postal now. American Woollen Mills Co., Dept. 1114, Chicago.

STOCK Absorbers—Big money proposition selling automobile owners; cut prices. Schultz, 1200 St. James St., Phila.

AGENTS—Biggest hit ever! Steam-plate Toilet Article Set, selling like blazes at \$1; with \$1 Carving Set Free! Enormous profits! Tremendous sensation! Experience unnecessary. Single made \$51.00 first week. Write quick! Pioneer Co., Dept. P, 904 Lake St., Chicago.

AGENTS—Introduce our new household specialties. Particulars free. Standard-A, 4 West 118th St., New York.

I MAKE \$2,000 yearly selling "Brightest" Gas Burners and "Perfect" Gas Lighters; splendid combination; easy sellers; enormous profits. Both samples, 10c. Get particulars. C. Labow, 126 East 16th, New York.

OUR line of brushes is a winner. So is our proposition. We want live brush agents everywhere. United Brush Company, 422 W. Lake St., Chicago.

GET cash for names, information, ideas, formulas. Turn what you see, hear and know into money. Instructive booklet for stamp, Information System, 282 Marietta, Ohio.

AGENTS—Can you sell gasoline at one cent per gallon? If so, sell "Gas-Trade." Gives 40% more gasoline mileage; eliminates carbon. Auto owners grabbing for it. \$10 a day easy. Helzer made \$25 first day. Act quick, man. Details free. White Mfg. Co., Dept. 112B, Cincinnati, O.

BIG Business for Agents—New clothes washing machine. Fits set or ordinary tubs. Sells for \$10, with big percentage of profit. Won medal Panama-Pacific Exposition. Just the thing for apartments. Write for proposition. Home Device Corp., 218 Bush Terminal, Brooklyn, N. Y.

AGENTS Wanted—High grade photo finishing and photo novelties. Ulrich Photographic Co., St. Louis, Mo.

AGENTS—Make your own toilet preparations, household necessities, etc. 140 good formulas, 25 cents (cash). Cassinough Manufacturing Co., Box 1100, Warren, Pa.

Will pay \$25.00 to reliable agents to distribute 140 free packages of Lice Powder to poultry owners. Poultry Remedy Co., St. Paul, Minn.

SELL one for every auto. Sample, 10c. Marcus Mfg. Co., River Forest, Ill.

AGENTS, lady or gentleman, for patented paper dental specialties. Twenty-five cents for samples and proposition. F. G. Crane, Muskegon, Mich.

YOU Can Sell Our Custom Raincoats. Large profits and raincoat free. You invest nothing. Harvard Raincoat Co., Dept. P, Boston, Mass.

AGENTS who can make \$2,000 and more yearly. No others apply. Fuchs-Kelly Co., 38 Park Row, N. Y.

AGENTS Wanted to sell a household specialty—used in most every home; quick sales—big profits. Write today for proposition. Alpha Alcohol Utensil Co., 140 Hamilton St., Newark, New Jersey.

AGENTS Make \$50 weekly selling \$10 starter and \$1.75 E. Z. Starter for Ford Cars. Write Geo. H. Wilson, 992 North-Western Bldg., Minneapolis, Minn.

WE want agents in the small towns and surrounding territories to introduce our gasoline lamps and mantles. Big money for the man who can sell. For catalogue and full particulars, address: Grand Rapids Novelty Co., 528 Woodlawn St., Grand Rapids, Mich.

AGENTS—Do you want something that sells rapidly, guarantees satisfaction and leaves a liberal profit for you? Sell our Ox-Acetene Welding and Cutting Outfits to garages, repair shops, etc. Big field. Write for attractive proposition. American Welding Co., 224 Michigan Ave., Chicago.

SALESMEN for high-grade specialties. Demonstration invariably results in sale. Send for free descriptive booklet and terms. The Mountain Mfg. Co., Upper Montclair, N. J.

BORN Letter Agents and Painters; 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 404 N. Clark St., Chicago.

ENDLESS Needles—Something new, twelve lines in one; costs no more than old style; man made \$10 three days; woman made \$92 week; write for special agents' offer. Endless Needle Mfg. Co., Dept. 10, Kansas City, Mo.

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 762 North St., Dayton, Ohio.

JUST show them—The new adjustable floor and wall mops, dustless dusters and sanitary brushes sell themselves. Big line. Big profits. Agents write Silver-Chamberlain Co., Dept. M, Clayton, N. J.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours, will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

YOUNG Men, would you accept a tailor-made suit just for showing it to your friends? If you live in a town smaller than 10,000, write Hammer Tailoring Co., Dept. 120, Chicago, and get beautiful samples, styles and a wonderful offer.

AGENTS—Here's a winner. The Midway Vest Pocket Garment Hanger—sells on sight. The most attractive proposition ever offered. 350% profit. No competition as article is fully protected by U. S. and foreign patents. Address: Dept. "M," The Silver Company, 171 Madison Ave., New York.

Men and women earn up to \$2,000.00 yearly distributing Guaranteed Mystery from mill to wearer. All or part time. Repeat orders insure permanent increasing business. No capital or experience needed. D. Parker Mills, 2735 No. 12th St., Phila., Pa.

INVENTIONS commercialized on cash and royalty basis. Inventors, Manufacturers and agents write: Adams Fisher Mfg. Co., 61 Fisher Bldg., St. Louis, Mo.

WANTED—Reliable Men and Women to place our Eggline in stores and appoint sub-agents. Take the place of eggs in baking and cooking at less than 3c a dozen. Chas. Mortensen Co., 4403-5 Madison St., Chicago.

YOU are looking for more long green. You doubtless deserve it, and willing to work for it. Our soap and toilet article combinations have every ear-mark of being real soap getters. We can prove that they are. Write for convincing proofs. Davis Soap Works, 61 Davis Bldg., Chicago.

FREE samples for men and women agents; double your money selling Delmar's Naptha Washing Tablets; washes clothes without rubbing; cleans floors, woodwork, pans, pans and dishes; polishes silverware; send for sample and particulars; not sold in stores. Manufactured and sold only by Naptha Washing Tablet Company, 714 So. Dearborn St., Chicago.

\$25.00 TO \$50.00 per week easily earned in your home town by representing reliable concerns, selling their live line of household necessities. Exclusive rights granted. Apply at once. Dept. 29, Consumers' Direct Supply Co., 48 Hanover Street, Boston, Mass.

NEWEST wonder of the age! Siltron, the polish that silver-plates. Actually rubs on sterling silver. Used everywhere. Sells on sight. Repeat orders. Big profits. Protection. Secure now. Introductory offer. Free sample. P. Carls Co., 137 Cedar St., New York.

AGENTS: \$1,400 to \$3,000 yearly selling over eighty every-day articles to farmers. Pleasant, permanent business. Full instructions. Big chance. Write quick. Truform Factories, Truform Company, North Java, N. Y.

MONTAROLA, concentrated perfume of the mountains. Youth restoring, health giving. Intoxicant. Sample 50 cents. Myrt. Strong, Ward, Colo.

\$1,400 PER Man per County. Strange invention starts well—agents arranged. Ten inexperienced men divide \$10,000. Korstad, a farmer, did \$2,900 in 14 days. Scholcher, a minister, \$105 first 14 hours. \$1,200 cold cash made, paid, banked by Remmen in 30 days; \$15,000 to date. A hot or cold running water bath equipment for any home at only \$4.50. Self-heating. No plumbing or waterworks required. Investigate. Exclusive sale. Credit given. Send no money. Write letter or postal to day. Allen Mfg. Co., 4137 Allen Bldg., Toledo, Ohio.

WINDOW Lettering Business. We start you free. Stahlbrie Co., Dept. P, Long Island City, N. Y.

\$15.00 MADE first day by 13-year-old boy with Shomescopie. Woman made \$8.00 first hour. Particulars free. Shomescopie Mfg. Co., 523 W. 12th St., Kansas City, Mo.

GET into your own business. Cut loose from lay-offs, short hours and wage slavery. Our catchy soap and toilet combinations have put thousands on Prosperity Road. Tremendous saving to consumer—200% profit for you. Send postal quick for details. E. M. Davis Co., 864 Davis Bldg., Chicago.

SELL Dry Goods Remnants. Greatest bargains on earth. Remnant Store Co., Cincinnati, Ohio.

WE are the largest manufacturers of twisted Wire Brushes in America. Highest grade goods, best service, largest profits. Our new Auto Specials are winners. Send for catalog. Fuller Brush Company, Hartford, Conn.; Rock Island, Ill.

NEW 1915 Model—Send no money. Just your name on a postal card, and learn by return mail how to get the best Vacuum Cleaner made, without costing you one cent. Shipped direct from factory, guaranteed for 5 years. Reliable, live agents wanted. The Warner Company, Dept. 2, Muncie, Indiana.

AGENTS—Sell the Primus, genuine Swedish wickless, coal-oil stove. Smokeless, odorless. Takes the heat of gasoline at one-eighth the cost. No danger of explosion. Big profits. James Anderson & Sons, Sidney, Ohio, American Distributors.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Day Pen Company, Dept. 2, Baltimore, Md.

READ the Agents Magazine and make more money. 2 issues 10c. Agent's Magazine, Chicago.

AGENTS—Air Cell Washing Machine. New, marvelous invention. Exceeds work of washers costing \$25.00 and up. Sells only \$1.00. No wonder every home buys. Exclusive territory free. Nearly 200% profit. Write today. Air Cell Washer Co., 3047 Huron Ave., Toledo, Ohio.

AGENTS—Average \$5 to \$12 daily selling astonishing Aztec massage machine. New. Just patented. Different. No electricity or water power required. Nothing complicated. Affords exhilarating massage without cent expense. Lowest priced, but best outfit. Details \$2.50 allowing you big end of the profit. Particulars and "beauti" folder free. Aztec Remedy Co., Dept. 132, Toledo, Ohio.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 504 N. Clark St., Chicago.

AGENTS—Sell rich-looking imported 36x 68 Rugs, \$1 each. Carter, Tenn., sold 115 in 4 days. Profit, \$57. You can do same. Write for sample offer selling plan; exclusive territory. Sample rug by parcel post prepaid, 98c. Condon, Importer, Stonington, Maine.

AGENTS make \$5 to \$10 a day on the spot. Arkless writes: "The best proposition I have found in my forty years' canvassing." Permanent work. Household necessity. Selling 80%. Write today for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 12c. Stamping Outfit, Emblem Checks, Check Folds, Name Plates, Hart Mfg. Co., Desk 2, 393 Degraw St., Brooklyn, N. Y.

YOU can be your own boss with our Key Check Outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 15 cents. Pause Die Works, Dept. M, Winchester, N. H.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Vourthes, Desk C. R., Omaha, Neb.

Big Profits for You! Manufacture Harley Crisp. New Confection. 5c package costs you 1c. Machine, instructions complete \$1.50 prepaid. Send 10c for sample. Harley Crisp Co., 1215 Broadway, San Francisco.

MAIL-ORDER Opportunities: 25 new propositions. No competition! Make 95c profit on dollar order; complete outfit 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

AGENTS make \$100 monthly selling our 300 handy household articles. Catalogue free. Scheff Company, Des Moines, Ill.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Herag Co., 1205 Randolph St., Chicago.

YOU can make \$500 as our general or local agent. Household necessity; saves 30 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pridin, 113 Redd St., Newark, N. Y.

AGENTS of ability and high character wanted on a new household article. Over 100 per cent profit. Special selling plan that pulls results. Address Merrill & Brock, 50 to 60 Temple Place, Boston, Mass.

AGENCIES WANTED

WANT good articles exclusively. Our staff covers New York. Send particulars, samples. Valmar, 261 Broadway, New York.

MAN of good standing and large acquaintance desires to represent reliable concern in Maine. Address W. Box 462, Portland, Maine.

SALESMEN WANTED

WANTED—An Agency that has three or four live-wire salesmen, to sell a citizenship association, direct from the manufacturer to the retail merchant. The biggest thing on earth for the money. Our big commissions will make you rich if you join the selling force. Answer, The E. H. Sebring China Co., Sebring, Ohio.

BRANDRUPP, One Petron shampoo stops most cases for week or more. Nearly every man buys. Every buyer gets immediate results. Sample free application, ten cents. Sanitary Methods Co., Desk "A," 122 Seymour St., Milwaukee, Wis.

SALESMEN—We have some excellent territory open to salesmen of ability. This is a proposition that appeals to the best class of concerns. Sales are easy and your profits large. Write us today for catalogue P. M., covering the Bellick All-Steel Paper Haler, Davaport Mfg. Company, Davaport, Iowa.

WANTED—Representatives everywhere. Exclusive territory. Gold sign letters for stores and office windows. Any one can put on. Write today for free sample. Metalite Letter Co., 405 N. Clark St., Chicago.

\$100 HAS been earned in 3 days by our representatives, some even better. Introducing our new advertising method which solves the advertising problem for merchants in smaller cities and towns. If you are or want to be a salesman I will show you how to build up a big profitable repeat business quick. Whole or part time. Big money if you set one. Write Salesmanager, Window Cabinet Company, 66 Congress Bldg., Boston, Mass.

\$1,000 PER year and expenses, salary or commission, selling remarkable labor-saving invention to farmers and people who own cows. Experience unnecessary. Enormous demand. Nothing in market like it. Positions being filled fast all over country. If you want job for your locality, or traveling, write quick for particulars, free sample and salary proposition. DeKing Mfg. Co., Dept. 13-01, Chicago.

SPECIALTY Salesmen—Large Eastern organization manufacturing patented, popular-priced office efficiency devices wants representatives in unoccupied territory. Splendid proposition. Small capital. Cash or credit. Fine line "repenters." Full protection. Ask for "Folder A." Chelsea Mfg. Company, 111 Broadway, New York.

SALESMEN: Sell the patented Sougfit back-of-neck flat collar button to dealers. Mounted on beautiful counter display cards. Gold plated; less fat; no bulge; tie slides easily; has no post or lever; cannot break; sells easily; liberal commission; exclusive territory. Sample and details positively free. Sougfit Company, Youngstown, Ohio.

SALESMEN: Pocket size line; new, live proposition; all merchants in towns of 100, 400 and under want it. Pays \$5.00 commission on each sale. No collecting, no risk to merchant. We take back unsold goods. Biggest, biggest paying side line ever offered. Canfield Mfg. Co., 208 Sign St., Chicago.

SALESMEN Wanted — Salesmen and Manufacturers' Agents to represent us everywhere among the Superintendents, Engineers and Purchasing Agents of Manufacturing Plants. Four famous Federal Products—Pulley Facing, Insulating Cement, Metal Paints and Graphites. The Federal Graphite Mills, Cleveland, Ohio.

MY Check Protector the best. Send quarter for sample. Satisfaction guaranteed. High Sales Co., Atlanta, Ga.

SALESMAN. Sell beautiful 28x58 Art-kraft felt runs for \$12.50 per doz. Your profit, \$3 per doz. Kelso, Battle Creek, Mich., sold 30 doz. last week. His profit, \$90. Write for exclusive territory and selling plan. Prepaid sample, \$1.50, refunded on first order. H. Cumber, Mgr., Stealington, Maine.

WANTED—Side line salesmen calling upon hardware and general stores. National Production Co., 130-134 No. Market St., Chicago, Ill.

HELP-A-PHONE, Salesmen make \$100 weekly. Write Edward, 415 Belden Ave., Chicago.

ADVERTISING Salesmen who wish to make a very profitable connection for 1916 should write us at once. Entirely new ideas to submit prospective customers. Competition eliminated. Exclusive designs, protected territory and liberal commission. The Hayes Lithographing Co., Lakewood Ave., Buffalo, N. Y.

SALESMEN—See our plan for Monogramming Automobiles and Motorcycles by transfer method. Very large profits. Motorists' Accessories Co., Ashland, O.

SALESMEN—Make Big Money on our Centex Portland 28s, Frames 15c, Glass 20c. Largest house in America. Est. 15 years. Samples free. The Culver Co., Box 104, Westerville, O.

PERMANENT income from sale of Transu (Transparent) face stickers. Every business house a possible customer; Commission basis; local or traveling salesman. Transu Paper Company, Chicago.

BIG Opportunity for hustling Salesmen. Selling Sanbo Two-Compression Starters for Ford. \$14. Guaranteed to start. Great demand. Salesmen with Ford preferred. Write Sanbo Starter Co., Desk A, Rock Island, Ill.

SALESMEN—Acquainted with merchants. Large demand. 12h. com. Pocket samples. World Salesbook Co., Chicago.

WANTED—Hustlers to take orders for made-to-measure high-grade men's tailored suits from \$15.00 to \$25.00. Make \$25.00 to \$50.00 weekly. Elegant large book outfit free. Experience unnecessary. No pocket folder affair. Splendid opportunity to make money. Handy Dandy Line, Dept. 28, Kensington St., Chicago.

GREAT opportunity for General Agents selling New Specialty to merchants. Details \$5, \$10, \$15 each. Your profit 200%. No competition. Exclusive territory. Free samples. Savers Co., 408 Walnwright, St. Louis, Mo.

HELP WANTED

WEN to erect Portable Automobile Garages and become car representative. Any one handy with tools and who can follow simple instructions can secure a good position in his own city. Write for full information. Address The Mueschl-Edwards Manufacturing Co., 3th Street, Burlington, N. J.

USE your spare time to build up a mail-order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Opportunities Exchange, Buffalo, N. Y.

WANTED—Man in your own territory. Salary of \$100.00 per month, traveling expenses and commission. Experience unnecessary. Write quick. R. D. Marnel, 2509 Indiana Ave., Dept. B, Chicago.

HELP Wanted—U. S. government wants clerks. Men-women, 18 or over. \$70.00 month. Vacations. List of positions now obtainable free. Franklin Institute, Dept. B-21, Rochester, N. Y.

FIREMEN—Brakemen; \$100 monthly, experience unnecessary; hundreds needed by the best railroads everywhere. Particulars free. Railway Bureau, East St. Louis, Ill.

\$150.00 SALARY for 60 days' work paid men or women in each town to distribute free circulars and take orders for White Ribbon Concentrated Flavouring. J. S. Ziegler Co., 7 P. East Harrison, Chicago.

MEN Wanted for Detective work. Also instructed by former U. S. Govt. Detective. Write J. Ganser, 2109 Cabaret, Chicago.

\$15.00 WEEK. Become Chauffeurs. Earn while learning. Sample lessons free. Franklin Institute, Dept. B-202, Rochester, N. Y.

MEN Wanted to make Toy Soldiers, Indians, Cowboys. Nuremberg's industry. War stopped importation. Great demand. Greatest homework proposition. Big business in larger scale. Tools, experience unnecessary. We buy all the soldiers if not sold direct to stores. Flooded with orders for months ahead. Castings from \$2.00 up. Interesting booklet, patterns, payoff free. Toy Soldier Manufacturing, 32 Union Square, New York.

BE a Traffic Inspector—We Teach You. A New Profession, \$4 a Day to Start. Unlimited Opportunities for Travel and Advancement. Positions Now Open. Frontier Train School, Buffalo, N. Y.

GOVERNMENT Clerks Wanted. \$60.00 Month. Full university. Common education sufficient. Vacations. Short hours. Rapid promotion. Write immediately for free list of positions now obtainable. Franklin Institute, Dept. B-21, Rochester, N. Y.

LEARN a Trade that pays well. Steady work. Billboard-Bulletin-Decorative-Photostat and Theatrical Screen painting taught at your own home. No experience required. Send 1c stamps for catalogue. Natl. Comm. Art School, Dept. A, 615 Omaha Natl., Omaha, Neb.

WANTED, Men 18 or Over, as Railway Mail Clerks. Sample examination questions free. Franklin Institute, Dept. B-21, Rochester, N. Y.

INVENTORS Wanted. Your Ideas may mean fortune. Send Sketch. Patents secured through new credit system. Book and advice free. Waters & Co., 4102 Warder Bldg., Wash., D. C.

I WANT a man of good character, aged from 20 to 60, for my special representative in his own section. No peddling or canvassing. High-class dignified work that you will like. Can make much more than you are now earning. If honest, ambitious and anxious to become independent for life, write today. Meltonell, Dept. 111, 1426 You St., Washington, D. C.

PLEASANT spare-time work; making circulars. Good pay. No scheme. Details free. Home Pub. Society, 48 N. 12th, Philadelphia.

WANTED—Circular Distributors, send 10c for Application Contract Sample Magazine. Oliver A. Barkley, Mount Pleasant, Pennsylvania.

THOUSANDS Government Jobs Open to Men and Women. \$65.00 to \$150.00 monthly. Write for list. Franklin Institute, Dept. B-21, Rochester, N. Y.

FIREMEN, Brakemen, Wanted, all railroads; \$120 monthly. Experience unnecessary. Railway Association, Dept. 205, Brooklyn, N. Y.

GET a Government Job! See ad on page 12. Write now—today! Parsons Civil Service School, Rochester, N. Y.

PHOTO-Plays Wanted. Big prices paid. We show you how. Details free. Rex Publishers, Box 175K, Chicago.

OWN a business. Co-operate with me—easily at home. Everything furnished. Don't worry about capital. Boyd H. Brown, Dept. B-10, Omaha, Neb.

WANTED—Men—Wise men. \$15.00 Month. List Government Jobs open—free. Franklin Institute, Dept. B-21, Rochester, N. Y.

A MONEY Proposition—Co-operate with me in a profit-sharing mail-order business. Will place trial advertisement, furnish printed matter, goods to fill orders and divide the profits. Particulars. Desk 155, Hazen A. Horton, Tekonsha, Mich.

COMMERCIAL Information Wanted. High-grade opportunity; no canvassing; spare time; confidential; good pay. Write for complete particulars. "Ciss," Pmc, Evansville, Indiana.

SILVERING mirrors. Plating tableware, auto-brush. Home booklet plus free. Clarence Sprinkle, Dept. 28, Marion, Ind.

WANTED—Men to get members and establish lodges on commission basis for the Oul. South Bend, Indiana.

BECOMING Detectives. Large salaries; easy work. Write Chief Wagner, 1213 Lexington Avenue, New York.

YOUR services are needed as Topographic Draftsman at excellent salary. You can learn from us soon. Get particulars, Columbia School of Drafting, Melachien Bldg., Washington, D. C.

DISTRIBUTORS Wanted—Good pay; steady work; giving away packages. Perfection Borax Soap Powder with Soaps, etc. No capital or experience needed. S. Ward & Co., 218 Institute Pl., Chicago.

WHITE Moving-Picture Plays. Good prices. Devote all or spare time. No correspondence school. Details free. Atlas Publishing Co., 3015, Cincinnati.

MEN to refinish lighting fixtures, brass beds, etc. All or spare time. No capital or canvassing. Experience unnecessary. Information free. Commercial Co., Dept. G, Detroit, Ill.

STAY Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Forbion, Desk C. R., Omaha, Neb.

BE a Detective—Earn from \$154.60 to \$309.04 per month. Travel over the world. Write C. T. Ludwig, 240 Wessover Building, Kansas City, Mo.

WANTED—An Ideal Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write for "Needed Inventions" and "How to Get Your Patent and Your Money." Randolph & Co., Patent Attorneys, Dept. 144, Washington, D. C.

GO on the Stage, Vanderbilt career offered you. Experience unnecessary. Managers endorse my method. Instructive Vanderbilt book free. Write today. Fredric LaBelle, Bldg. 19, Jackson, Mich.

GOVERNMENT Examinations. Most thorough preparation. \$5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

EARN \$20 weekly collecting names and information. What you see, hear and know is worth money. Send stamp for instructive booklet. Information System, 331 Maricopa, Ohio.

WANTED

WANT good second-hand visible type-writer. Arthur Held, Millersburg, Pa.

WANTED—Old Watch Cases. Douglass Bros., Birmingh., Mo.

WANTED—A first-class reliable article to handle as side line. Novelty Altar Co., Stamford, Conn.

WANTED—Two good Cash Registers cheap. Chester Olson, Kewanee, Ill.

FOR SALE

15-LIGHT Acetylene Gas Plants, Green-alter, Fixtures, Chandeliers, Pipe; cheaper than electricity; fully guaranteed; easily worth \$50; all complete for \$21.50. Write Daniel Zimmerman, Magley, Indiana.

OPERATORS' Bells \$10.00. Mills Floor Venders \$14.00 each, like new. Few others cheap to show and quick. Auto Vending Company, Minneapolis, Minn.

SLIGHTLY used trunks and levels for sale; good bargains from \$75 to \$150. Foreigner Instrument Co., 203 Cassa Ridge, St. Louis, Mo.

FIELD and Martins, Day and Night Glasses, with beautiful case. \$5.00; adjustment; \$30 value, only \$7.50. Money back if not satisfied. Wells' Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

FIELD Glasses, 9 power, case, strap. \$6.25 postpaid. Zehrbach & Chikshank, Lehigh, Ohio.

VACUUM cleaner pumps and parts for assembling, save 15%. Vacuum Supply Co., Ann Arbor, Mich.

FOR Sale—Sixty latest style charcoal flat-irons, cheap. Chance to make \$100.00 easily. Box 370, New Bedford, Mass.

TENTS Cheap, Send for list. V. G. Gustafson, Joliet, Ill.

SALE OR EXCHANGE

M. H. P. is a "country-wide" trading service. Have you a farm, auto, gun, camera, etc. We can put you directly in touch with people who want what you have. Free pamphlet. Matthews-Ranch Publicity, 54 floor, Mallers Bldg., Chicago.

PATENT—Attractive: Hardware, Furniture, Improvement Manufacturers. Want South Florida citrus land. Lock Box 1146, Miami, Dade County, Fla.

WILL trade Self-Heating Iron for printing, or what have you? Dubatone, Hart Street, Providence, R. I.

VIEW Camera Quilt Field Glass to Exchange. Clayton Williams, Fred, Ky.

PATENT Chugging Keflow. Will trade stock for iron pipe couplings or fittings. The A. & J. Mfg. Co., 359 W. Lake St., Chicago.

FLOUR & FEED MILLING MACHINERY

SPECIAL bargains in second hand Attrition mills, burr mills, crushers, corn shellers, bran chutes, dust collectors, pulpers, rolls, double, single, 2 and 3-pair high roller mills, stone rollers, receiving separators, sifters, etc. Write for description and prices. Sprunt, Washburn & Co., P. O. Box 129, Minn., Pa.

ENGINE CASTINGS AND BLUE PRINTS

GASOLINE Engine Castings, with drawings. Cheap. Catalog for stamp. Norcity Manufacturing Co., 322 West 6th St., Cincinnati, Ohio.

MACHINERY, TOOLS AND SUPPLIES

18"x8" PRATT & WHITNEY planer, good order, \$175. Two large wood frame circular saw tables each \$20. Large Fay & Engen jig saw with tilting table \$35. Three heavy punch presses, good order, \$75 each. 12 H. P. compound marine engine with fittings, A-1 condition, \$50. 6x9 Clinton duplex air compressor, belt driven, \$80. 10x12 Newark steam driven compressor, 100 to 2400 lbs. capacity, \$300. Two 14"x5" engine lathes \$50 each. 2 Spindle Pratt & Whitney profiler, old style, but in good condition, \$100. Two 4-cylinder 18 H. P. air-cooled engines, each \$45. Send for better descriptions. J. L. Lucas & Son, 5 Fox St., Bridgeport, Conn.

VISES for Sale. Have a limited stock of stationary-type blacksmith, pipe and machinists' vices. Below cost while they last. Purhan Machine Company, 25 Tenth Street, Detroit, Mich.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 110. W. A. Jones Foundry & Machine Co., Chicago.

GLASS Cutter, improved type; cuts and thickens. Saves labor, time, money. Saves the hands. Dr. Smith & Hemenway Co., 1615 Chambers Street, New York City.

35-H. P. MARINE motor, \$42. Auto parts, etc. Send for bargain list. V. G. Gustafson, Joliet, Ill.

FOR Sale—New Power Bark Saw, capacity 4 in. by 4 in. \$15. New 10-inch sensitive bench drill press, drilling capacity 3/4 inch, \$15. Passman Bros., 23 So. Green Street, Chicago, Ill.

VACUUM Pumps and Cleaners, all sizes; complete outfits. Thurman Vacuum Cleaner Co., manufacturers, Dept. O, St. Louis, U. S. A.

VACUUM cleaner pumps, tools, etc., for stationary house or wagon outfit. Vacuum Supply Co., Ann Arbor, Mich.

HAVE for sale several sizes of lathes, milling machines, drill presses, punch presses, shapers, planers, ladders, steam engines, all gas and gasoline engines and wood-working machinery. Planer, 122 Water St., New York, N. Y.

ENGINE Lathes, swings 2 1/2 in., takes 2 1/2 in. between centers. Complete set gears cutting all size threads 3 in. to 40 in., \$12.50. Grammes & Sons, Allentown, Pa.

ENGINES, MOTORS AND DYNAMOS

ALTERNATING and direct current motors guaranteed for one year, at bargain prices. Sizes 1/20 h. p. upwards. General Electric, Fort Wayne, Wagner, Westinghouse, Emerson. Motors bought, exchanged, repaired. Send for new illustrated bargain list motors and supplies. Hyre Electric Co., 415-C, South Dearborn St., Chicago.

CHILLERS Steam Engine for Sale. E. Weisheit & Co. Corliss engine, girder frame with bearing crank shaft, size 22x12, with 16"x28" cast-iron flywheel. Can be seen Kravine Leather Co., Camden, N. J.

LATHES and engines for sale. Send for list No. 31. Lucas & Son, Bridgeport, Conn.

GASOLINE Engines, 1/2 horsepower, \$15 complete. \$10 bare. Mottis Mfg. Co., Newberg, Kentucky.

DYNAMOS, 50-Light \$60; 100-Light \$80; payment, \$5 per month. Robert Bros., Trent, Ohio.

TEN 3 H. P. 2-cylinder gas engines, each \$10.00. Send for photo. Lucas & Son, Bridgeport, Conn.

SAW Mills, Single Mills, Corn Mills, water wheels, hot presses, saws and steam engines, 25 and 11 hp. gasoline motor. DeLoach Mfg. Co., Box 511, Atlanta, Ga.

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The Story of "Conscious Evolution" and its Discoverer

By DONALD RICHARDSON

THE simple fact that the human body is built up of billions of cells, all resulting from the evolution of one original cell, is in itself interesting, but little more to the average person. The further declaration that health, life and pleasures of the body depend upon the condition of each individual cell compels notice.

When, however, along comes an individual who combines intimate scientific knowledge of the human cell with the discovery of the means to insure its health and develop unusual energy and potency—who by reason of study, experience and a certain genius, shows us how, without inconvenience, apparatus, drugs, study or loss of time, we can put unusual health and uncommon life into every one of our vast multitude of cells, thus giving the human body and mind the maximum of health, pleasure and power, and do this in a very perfectly natural, easy and practical way—then we are all attention.

A Great Secret of Life

This is the marvelous secret uncovered in a wonderful little book by Swoboda, a great pioneer in the realm of physiological science. Some day the complete history of "Conscious Evolution" and its discoverer will be recorded, with all its immense significance and far-reaching ramifications. This brief article can only sketch the rough outlines.

The story of Alois P. Swoboda is one of the romances of human history. As the discoverer of the origin and nature of the laws governing "conscious energy," and of a scientific system for applying those laws in a manner that has operated successfully in over two hundred thousand cases, Swoboda occupies a peculiar niche in earth's hall of fame. He did not merely write a great book, paint a great picture, invent some useful device, or win some particular battle. His fame is built on a far more substantial foundation. He is the wizard of the human body. He is the apostle of the greater, the successful life. Swoboda not only re-creates men and women; he makes them more powerful, capable, and happy than they were before. He advances them a tremendous way along the line of human development. The man himself—as well as his hosts of enthusiastic clients—is a most convincing example of the effectiveness of his methods. He has revolutionized the methods of energizing the body and mind.

The Swoboda System of Conscious Evolution Based on a Knowledge of all Sciences

Swoboda fairly radiates vitality, his whole being pulsating with unusual life and energy. And his mind is even more alert and active than his body; he is tireless. He discourses with learned fluency on the science of "Conscious Evolution," which embraces all other sciences entering with equal ease and facility on any phase of this all-important subject. Start him on his particular specialty—the development of human powers—and he pours out a veritable flood of illuminating exposition. Earnest and vehement, he rises to eloquence as he unfolds in his masterful manner the magnificent possibilities of man under the guidance of "conscious energy." You are impressed with the fact that you are in the presence of a remarkable personality, a superior product of the Swoboda system of body and personality building. Swoboda embodies in his own super-developed person the best proof of the correctness of his theories and of the success of his "Conscious Evolution."

The Aim of Conscious Evolution is Better Minds, Better Bodies, Better Health and More Intense Pleasures

Mr. Swoboda must not be classed with ordinary physiologists, physicians, faddists or with those whose aim is merely the development of muscle. Neither his philosophy nor his science is confined to such narrow limits. Swoboda's plan comprehends the complete development of the human being—increased internal force, more body power, more brain power, mind power, and, in fact, greater capacity to live and enjoy in every way. He is primarily interested in those influences which make for a fuller and more potent life.

One cannot remain long in the presence of Swoboda without realizing that he is mentally and physically a superman. He makes you feel that you are only partially well, and vigorous and ambitious, only partially developed, that, in short, you are only half as alive as you must be if you wish to enjoy to the full the benefits of living—that you are leading an inferior life. No one can read his book without becoming conscious of his wonderful power and personality.

Swoboda is a Man Who is Centuries in Advance of His Time

His discovery of Conscious Evolution is itself of epochal importance. But its scientific and successful application is more wonderful still.

The feat of Franklin in drawing the electric spark from the clouds was a wonder of the time. Yet it took a hundred years to master the secret of that electric spark and harness the giant force of electricity to the uses of mankind. Swoboda not only discovered the marvelous secret and principle of Conscious Evolution, but applies it to individuals with results that are incalculable. Swoboda might, indeed, be called a specialist for the human race.

A single electric spark is of little importance. But intensify that spark and multiply it a billionfold, and you have the power, the heat and the dazzling lights of a great city. So with our cells, says Swoboda. Quicken one, and it makes little difference. But energize and intensify them all, and you have a "live-wire" human being, with mental and physical potency plus!—the Swoboda kind of body and mind.

What would happen to a business man who allowed half of his workmen to idle away at their machines, not only losing their own time and effort, but interfering with the producing power of the rest of the force? Yet that is exactly what the average human being does with the workers in his physiological factory. You have a most ingenious pleasure and power producing machine in your possession. The machine that means health or weakness, pleasure, happiness, success or failure, and yet you allow it to practically run itself, or erroneously believe that when this machine is ready to completely crumble that some physician possesses the magic power of restoring your health and life through the use of a drug. Far from securing health and pleasure, however, this resort to and belief in extraneous assistance really encourages physical and mental decay, because it weakens, by non-use and neglect, the body's natural resources, power, and means of recuperation.

The Human Body is a "War Machine"

The commander who goes into battle with an incapable army is handicapped at the start. The man who goes into the battle of life with his physiological forces far below par is foredoomed to at least partial failure. The great bulk of us are hardly drawing on our tremendous stores of energy and vitality. We are letting our cells grow stale and sluggish. Our human machine should be running in perfect condition in order that we may get the most out of it, before we can enjoy its full powers in complete and rounded fashion. Strengthen the vitality of these cells and you not only make the body more alive, but the brain more susceptible to new ideas from without, as well as greatly increase its own power to generate ideas. Many a man is getting a great deal of pleasure out of his mind, but nothing out of his body.

Ponce de Leon's fountain of youth died with him. Your fountain of youth will die with you. Each man's fountain of youth is within himself. Through Conscious Evolution only can you drink to the full of the fountain of youth.

Swoboda demonstrates that, no matter how old we may be, we can, through the conscious use of the principles of Evolution, make ourselves full-powered dynamos, with every part and wheel and power-belt

thoroughly in trim, working smoothly and at maximum capacity—100 per cent efficient.

If you believe you have developed to the highest degree your vitality, energy and powers of living and enjoying, you are, according to the Swoboda Standard, indeed mistaken. Conscious Evolution can lead you to a new and even greater realization of health, energy and pleasure.

More power, energy and life are the needs and will be the salvation of the present generation. The problem has always been how to get them. Eagerly we try each solution offered, swarming like the Athenians after every new thing. And yet the means lie right within us, as Swoboda clearly demonstrates.

Conscious Evolution is an antidote to old age in its every form and variety of conditions. It scientifically reduces excessive blood pressure, restores elasticity to arteries and turns the dial of physiological time in the direction of youth, efficiency, vitality and greater pleasure.

No one who is energized through Conscious Evolution will be subject to indigestion, intestinal sluggishness, nervous exhaustion, brain fog, sleeplessness, nervousness, or any functional difficulty of any character.

Swoboda Has Written a Wonderful Little Book

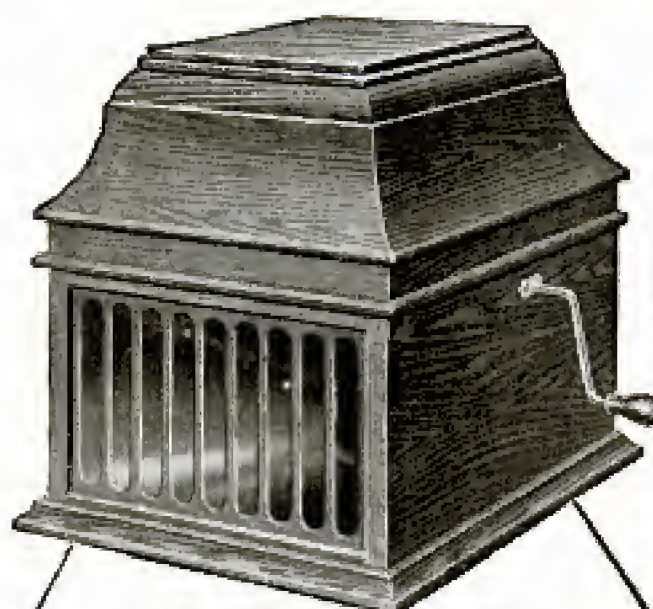
This book explains the Swoboda System of Conscious Evolution and the human body as it has never been explained before. It makes clear Swoboda's new theory of the mind and body. It startles, educates and enlightens. It tells how the cells build the body and how to organize them beyond the point where nature left off, for each one of us. It will give you a better understanding of yourself than you could obtain from a college course; the information which it imparts cannot be duplicated elsewhere at any price. It shows the unlimited possibilities through conscious evolution of the cells; it explains Swoboda's discoveries and what they are doing for thousands of men and women of every age and condition. It tells of the Dangers and After-effects of Exercise, and Conscious Deep Breathing. Swoboda's book shows how any one may possess unusual health and vitality.

You will cherish this book for having given you the first real understanding of your body and mind and for showing you how you may be able to attain greater pleasure and in every way a superior life.

Thousands have advanced themselves in every way through a better realization and conscious use of the principles of evolution which Swoboda discovered. It will open new avenues through which you may become successful in satisfying your most intense desires. It is not a dry treatise on physiology; on the contrary, it tells in a highly interesting and simple manner just what you need to know about the body and mind and the laws of their evolution.

Do not fail to take advantage of this opportunity to obtain a copy of this book while it is free. Address Alois P. Swoboda, 1331 Aeolian Bldg., New York City.

Since writing the above the writer has met a man who said: "Although I have been a close student of the body and mind all my life, and am a writer on the subject, Mr. Swoboda's book gave me a deeper conception of the body and mind than I have attained from years of study. Intellectual men and women must find his book of great interest. His theory of the body and mind was entirely new to me, and I believe that he is right."



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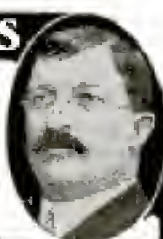
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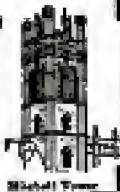
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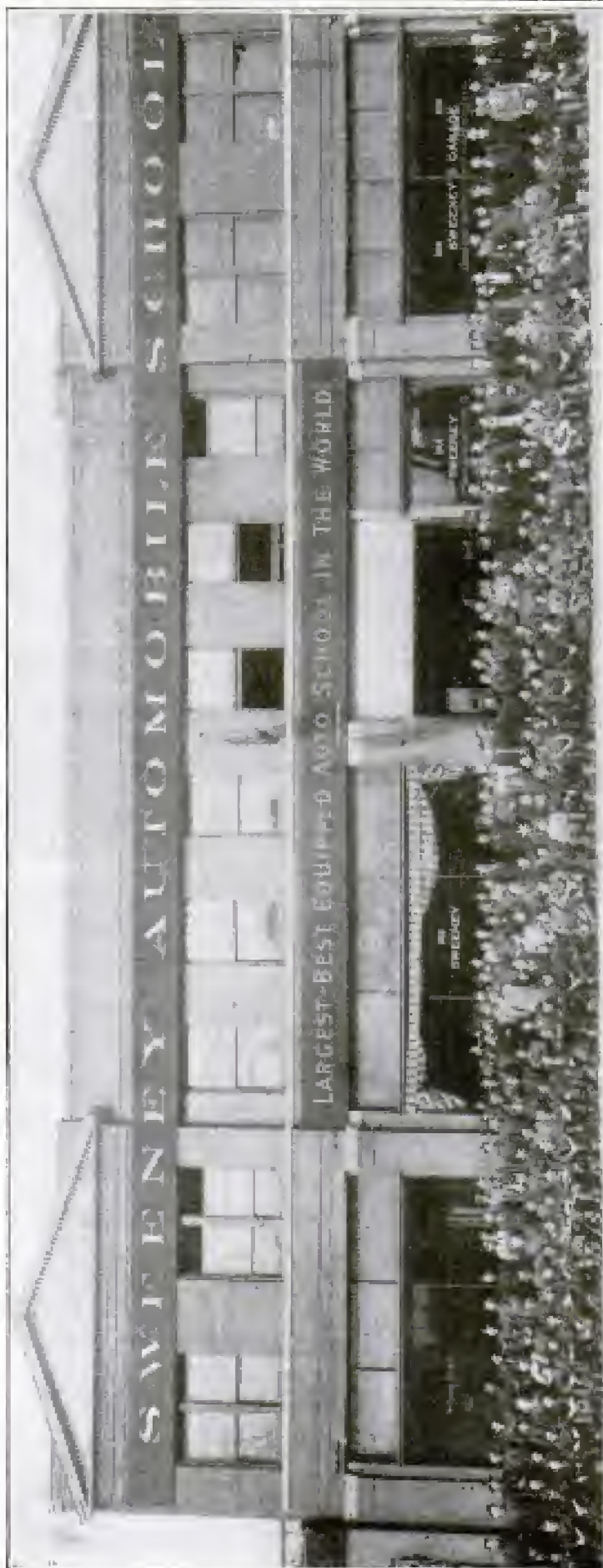
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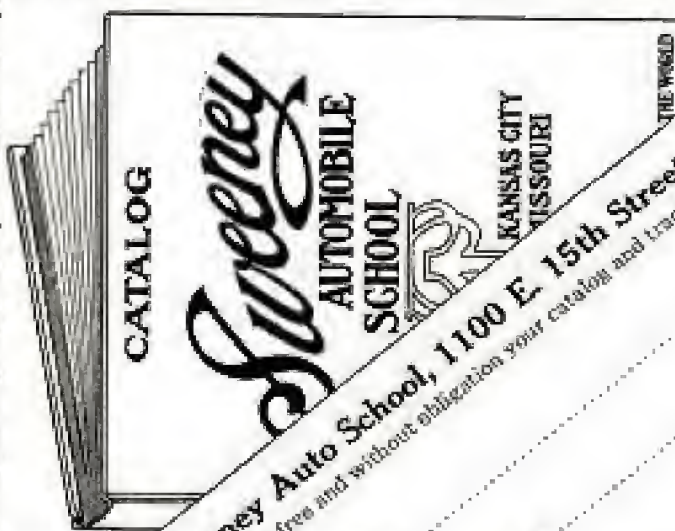
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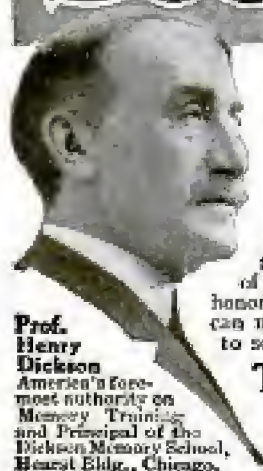
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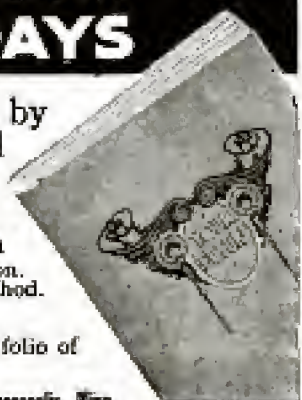
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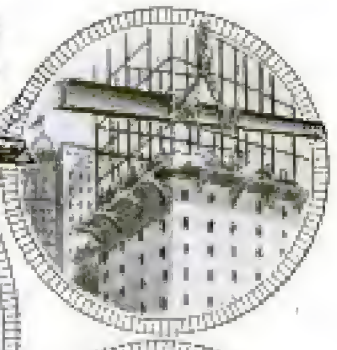
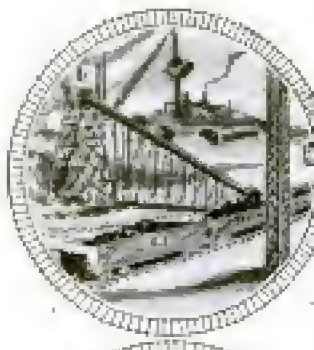
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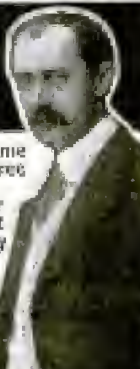
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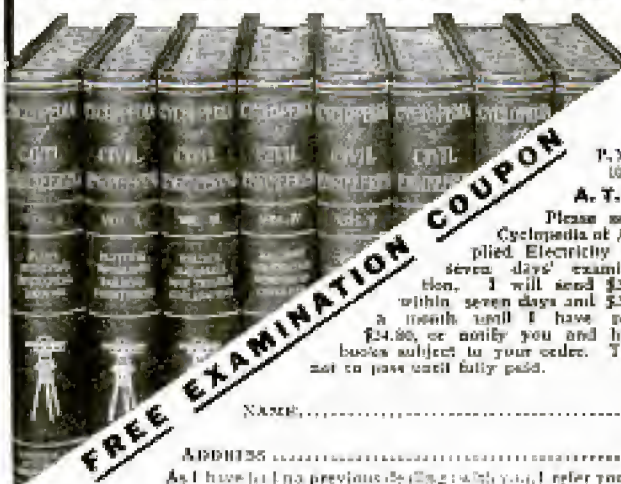
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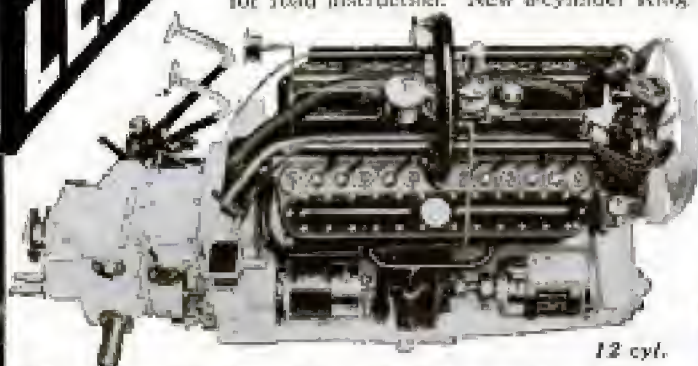
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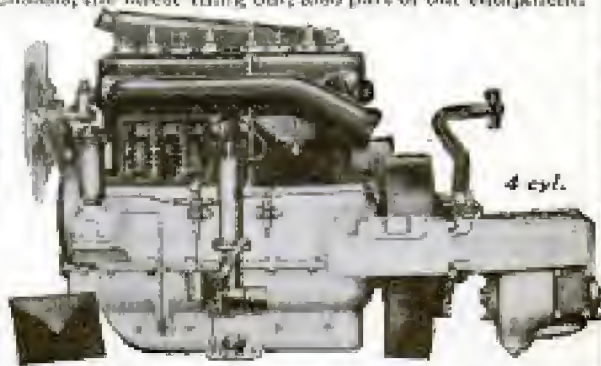
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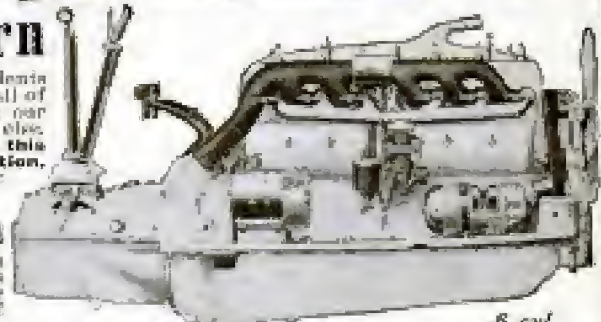
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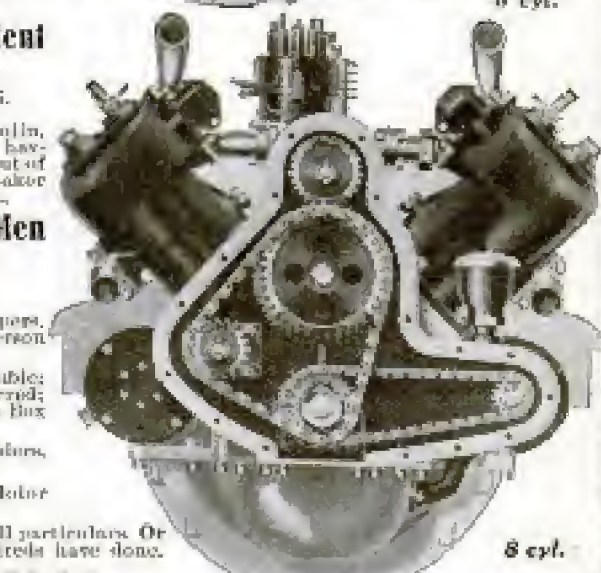
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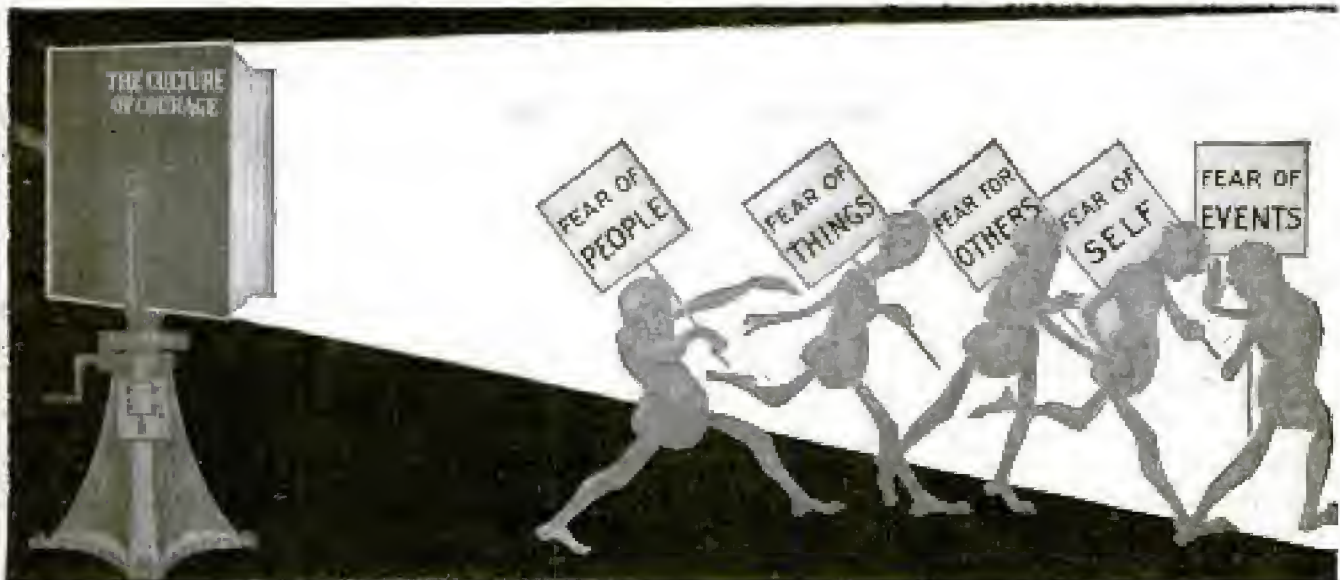
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Fear of self—fear of people—fear of the future—fear of things—fear for others (Worry)—are what keep men and women down when they should and could be on top.

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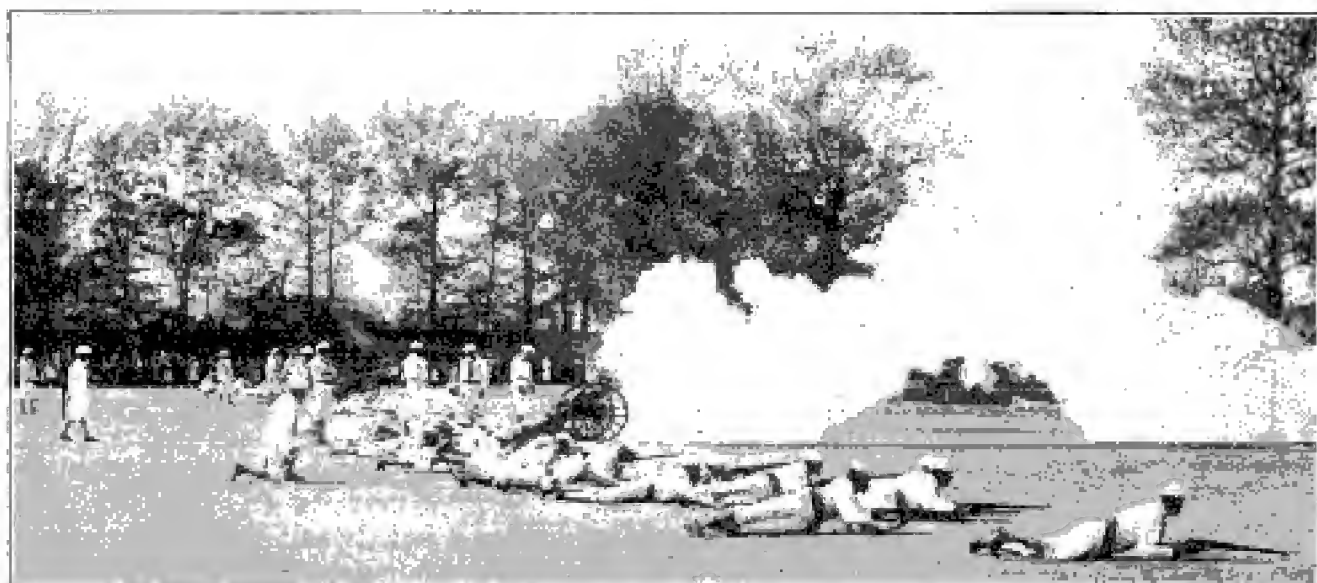
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Vol. 24

OCTOBER, 1915

No. 4

327

Boat Has Wings That Skim the Surface

THE latest development in racing motorboats is a craft capable of making from 60 to 80 miles an hour and equipped with wings that are designed to catch the water just as the wings of an aeroplane catch the air. This boat is 19 ft. 9 in. long and 12 ft. wide over-all, each of the wings being 3 ft. wide and the hull 6 ft. wide. It is equipped with a 250-hp. racing engine which ordinarily runs at 1,500 revolutions a minute and drives the propeller at 2,250 revolutions a minute, or one and a half times its own speed. One of the novel features of the boat is that the rudder is at the bow, while the helmsman sits at the stern. With this arrangement the boat is easily handled at any speed, one

effect of the bow rudder being that the boat, in making a turn, has a tendency to pivot around the rudder. This craft is apparently built specifically for high speeds. At less than 15 miles an hour the stern drags deeply, the bow point-

Brown & Dawson, Stamford, Conn.



The Planes are Designed to Carry the Craft on the Crest of the Waves, Supporting It in the Same Manner That the Wings of an Aeroplane Bury That Craft in the Air

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Designed & Built for Chas. Chesbrough of Northport, L. I., by A. E. Luders of Luders Marine Construction Co., Stamford, Conn.

ing upward at an angle of about 20° . From this speed up to about 30 miles an hour the bow slowly lowers as the speed is increased. Above this speed the boat settles down, under the action of its propeller, to a level position and skims the surface evenly, the speed increasing perceptibly with each increase in the application of power.

SPORTSMAN'S WATCH BUILT WITH COMPASS IN-CROWN

Novel features are embodied in two inexpensive watches which are being introduced by an eastern maker. One of the instruments mounts a miniature compass in its crown, while the other



The Compass is Mounted Neatly in the Crown so That It Does Not Detract from the Appearance of the Watch

holds a small cigar cutter in a similar position. Because of the manner in which these devices are mounted, they do not detract from the appearance of either timepiece. They are made in No. 14 size, thin model, with antique pendant and pull-out stem. Although the compass is small, it is adequate for ordinary needs on short hunting and fishing trips, and may also be used conveniently by motorists and cyclists.

RADIUM EXTRACTED CHEAPLY BY GOVERNMENT EXPERTS 351

According to an official announcement, a new process for the extraction of radium from the carnotite-ores of Colorado, which has been undertaken by the Bureau of Mines, is now being employed profitably on a manufacturing basis. The experimental work has passed and the results are far more gratifying than was even expected.

Metallic radium has been produced in the form of a bromide at a cost of \$36,050 a gram. The great importance of this may best be appreciated by comparing the figure with the ordinary prices for the substance, which have ranged between \$120,000 and \$160,000 a gram.

Slightly more than three grams of the metal have been obtained in the form of radium-barium sulphate. The ratio of this is more than one milligram of radium to a kilogram of the sulphate. Ten carnotite claims at Long Park, Col., which are owned by a steel company, have supplied the ore for the work. From these deposits 796 tons of ore, averaging two per cent uranium oxide, have been obtained.

Conversion of the radium-barium sulphates into chlorides and the refining of the radium is accomplished easily and without much loss. A concentrating plant has been erected at the mines and is now recovering material which was formerly wasted. Grinding and sampling machinery has been installed at Denver, where a radium-extraction plant has also been erected and is now in operation. The figures covering the last five carloads of ore, received prior to July 1, show that 90 per cent of the mineral was recovered. An announcement of the methods employed in mining and concentrating the ore and extracting the radium is to be made by the government in a short time.

Signs identifying points of interest, such as historical battle fields and prominent rivers, are being erected along the right of way of a southern railroad.

GIANT WAR HAWK OF GERMAN AERIAL CORPS



WAR correspondents are describing the appearance in northern France of a German "battle aeroplane" of the dual-tractor, twin-engine type which has all but driven its enemy from the sky. This machine is a biplane of 70-ft. wing spread. It has two separate fuselages, in each of which is installed a 100-hp. motor, and between these an armored nacelle which mounts machine guns. It maintains a six-hour patrol safely out of firing range at a height varying between 4,000 and 8,000 ft. While awaiting the appearance of prey it sweeps the sky in broad circles. Then it swoops down like a hawk and gives battle. Observers assert that the machine is superior to any other yet developed.

C. J. Silver Motor Co., 1760 Broadway,
New York City

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POPULAR MECHANICS

DRAWER SEATS PROVIDED IN MOTOR ROADSTER

One of the new body designs for a roadster provides seating room for six persons. Four of the seats are purely

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The Drawer Seats at the Sides are Pushed Out of View When Not in Use

auxiliary and are closed from view when not in use. Two drawer seats, one on each side of the machine, which may be pulled out over the runboards when desired, take care of a couple of passengers. This feature is especially convenient and odd. When not required, the side seats are pushed into the body out of sight. Space for two other persons is given in a cockpit constructed at the rear. When this room is not needed the space may be closed and, if wished, used for storage purposes. Both of the features are well worked out and do not impair the appearance of the car.

INDUSTRIAL IMPORTANCE OF SULPHURIC ACID

In recent years sulphuric acid has assumed such great importance in an industrial and commercial way that statistics showing the production are now given out annually by the United States Geological Survey. This material is probably used in a greater vari-

ety of ways in the chemical arts than any other substance. The most important classes of industry in which the consumption of sulphuric acid is involved are the manufacture of fertilizers, the refining of petroleum products, the iron, steel, and coke industries, the manufacture of nitroglycerin, celluloid, and similar products, and in general metallurgical and chemical practice.

381—La Nature. PANORAMIC PERISCOPE MADE FOR FRENCH SUBMARINES

France has at last developed a panoramic periscope which is capable of providing a commander of a submarine a constant and clear view of the horizon in all directions. The instrument, which is reliably stated to be successful, represents one of the most important inventions recently made for facilitating the operation of submersible vessels. Of late years much effort has been expended in perfecting a periscope of this character, but until now the results have been unsatisfactory.

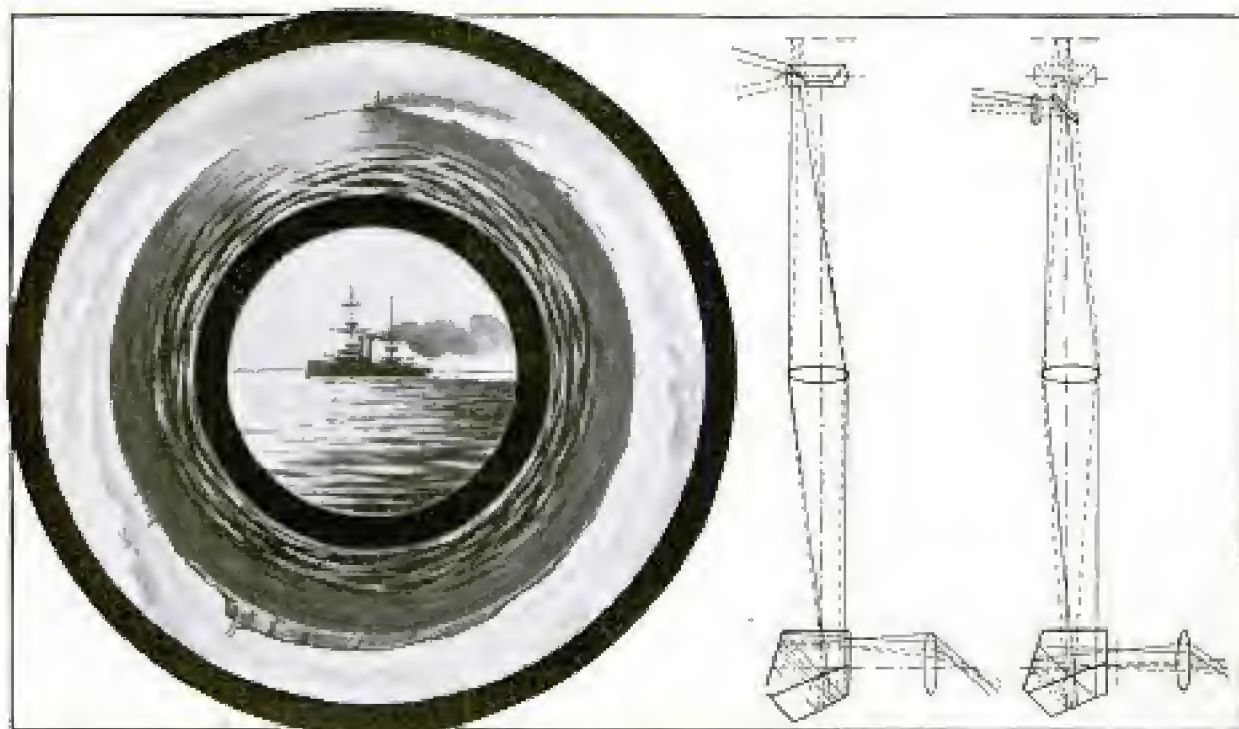
One of the great handicaps imposed upon the operators of modern submarines has been the inability to see in more than one direction at a time. Only by turning a periscope, or encircling a "walk around," has it been possible to scan the whole horizon, and then not at a single glance as now.

At the top of the new instrument is an annular lens, the exterior of which has a spherical curvature while the interior is ellipsoidal. Images of everything discernible about the whole horizon are first refracted and then reflected down the tube. They are collected in a horizontal plane by a condenser set midway in the tube, and thrown upon a five-sided prism at the bottom which reflects the rays twice and projects them through binoculars. The view given the observer is circular; much the same in appearance as if he were looking at one side of a globe.

This describes one half of the instrument, which in reality is a double periscope. Immediately below the lens at the top of the tube is a second eye and

Booklet on Sulphur
by U. S. Geological
Survey.

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COURTESY OF LA NATURE

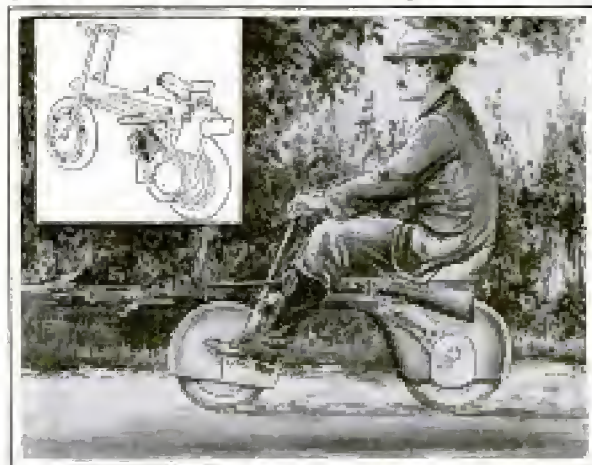
In the Center of the Panorama Appears the Image of a Ship upon Which the Eye of the Inner Periscope is Focused. In the First of the Diagrams the Full Lines Show the Refraction of Rays Admitted by the Annular Lens, While in the Other They Indicate the Path of Those Forming the Middle Image

this may be turned in any direction and focused on a specific object, just as an ordinary periscope may. The rays entering it pass down the tube in the same manner as the others, but without interfering with them. The image appears in the center of the panoramic picture and is greatly magnified in comparison with individual objects shown in the latter.

MINIATURE RUNABOUT BUILT FOR USE IN CITY STREETS

What is without doubt the most curious motor-driven vehicle that has yet made its appearance was recently demonstrated in the business streets of Baltimore. It is a diminutive adaptation of the motorcycle and not a great deal larger in size than many of the manually propelled conveyances driven on city sidewalks by small boys. The device is designed not as a plaything, but as a quick, ready means of transportation. A compact $2\frac{1}{2}$ -hp. motor, which drives the machine at a maximum speed of 25 miles an hour, is mounted at one side of the rear wheel. The fuel and oil tanks are embodied in the frame, and it is stated

that one gallon of gasoline will carry the cycle approximately 75 miles. To prevent mud and water from splashing onto the rider, the wheels are nearly incased in specially shaped mudguards. The machine is 4 ft. in length, 18 in. high, 9 in. wide, and weighs 45 lb. It is equipped with a "kick starter" and is controlled in a novel way. By moving the handlebars forward the speed is increased, while by drawing them all of the way back the clutch is disengaged, the engine throttled, and the brakes applied.



While Weighing Only 45 Pounds, the Little Machine Is Capable of Carrying a Weight of 300 Pounds at a Speed of 25 Miles an Hour

Liberator Nov-400

Distributors

The Coalition Company, Inc.,
Universal Machine Co., 50 Church St.,
Industrial Bldg., New York City
Baltimore, Md. are the actual manufacturers.

Copyrighted material

The "Motorcycle" N.Y.C. is a very interesting thing to see. It was shown at the World's Fair, 1914-15, and is a very interesting thing to see.

QUEER EYEGGLASS MOUNTING DESIGNED BY INVENTOR

In an effort to devise a means of mounting eyeglasses so as to avoid the skin irritation sometimes caused by the bows resting around the ears and the



The Glasses are Suspended before the Eyes from a Bandagelike Headgear

bridge pinching the nose, a Nebraska inventor has patented an odd plan for suspending the lenses before the eyes. While the arrangement cannot be called an attractive one so far as appearances are concerned, it may benefit certain persons who are compelled to wear glasses constantly and find the ordinary mountings objectionable. Large lenses, each having a straight edge on the inside so as to fit close to the nose, are secured at the top to an adjustable yoke. The terminals of this are fixed in a headgear, or cap. In this manner the weight of the glasses is supported above the nose, the lenses merely hanging in front of the eyes.

☛ Flying an American-made tractor biplane, Raymond V. Norris, carrying three passengers, recently reached an altitude of 8,300 ft. at Buffalo.

MUNICIPAL RENTING AGENCY ESTABLISHED AT MILAN

Modeled after the system in vogue at Paris, the authorities at Milan, Italy, have established a municipal renting bureau, the fundamental purpose of which is to enable a stricter supervision of sanitation conditions than has been possible in the past. The idea originated at a tuberculosis congress some time ago and a movement was immediately launched to crystallize it. When an owner lists his property with the municipal agency it is thoroughly inspected in regard to both cleanliness and location. A bulletin is issued periodically, giving the locations of various vacant apartments in the city. This is distributed free, and no charge is exacted for the service from the owner.

PHONOGRAPH FOR SETTLING FAMILY QUARRELS

A judge in Kansas City, Kans., proposes to use the phonograph in a novel way for settling family and neighborhood quarrels when they are brought into the police court. The phonograph is to be installed in the court room, and with it all the testimony will be recorded. After a few days all concerned will again be summoned and compelled to listen to the testimony, with the inflections of the voice and all interruptions faithfully reproduced. The judge believes that in the majority of cases the whole proceeding will then seem too petty to be carried farther.

RUNAWAY OIL CAR COLLIDES WITH PASSENGER TRAIN

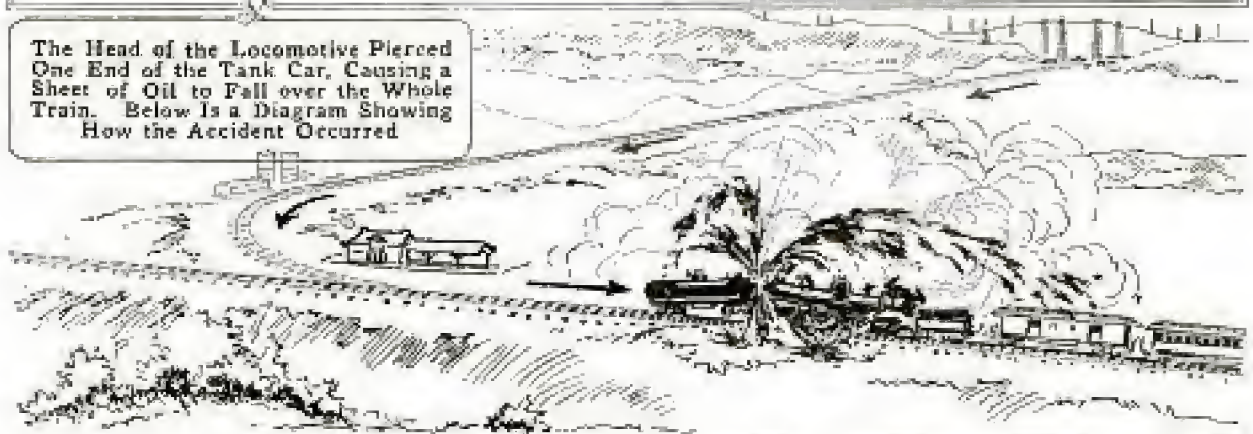
Only battered, twisted metal and heaps of charcoal remained of a passenger train following a serious wreck which recently occurred near the Olinda oil fields in California. The disaster happened when a large tank car filled with petroleum broke loose, rolled down grade for five miles, rounded a curve at an estimated speed



All That Remained of the Ill-Fated Passenger Train an Hour after the Collision Was a Snarl of Metal and a Long Heap of Ashes and Charred Wood. All but Two of Those Aboard Escaped Death



The Head of the Locomotive Pierced One End of the Tank Car, Causing a Sheet of Oil to Fall over the Whole Train. Below Is a Diagram Showing How the Accident Occurred



of 65 miles an hour and swung into the main line of a western railway just in time to crash, head-on, into a speeding passenger train. The impact caused the oil car and the locomotive to telescope, while the coaches at the rear were hurled back for some distance. A sheet of oil shot out of the smashed end of the tank, drenching the entire train. Almost instantly this was ignited by the heat from the engine's fire box, enveloping everything

in a cloud of flame and smoke. Fortunately the train was a local, carrying two coaches and a combination car, which were only partly filled. Because of this the casualty list was small.

During 1914, 172,296 tons of talc and soapstone were marketed. This was less by two per cent than the volume handled in 1913. The value of the production was \$1,865,087.

DOGS DRAW WHEEL CHAIR FOR CRIPPLED MAN

In order that he may make his way about the streets of the city unattended, a Pennsylvanian, who is



In This Chair the Man is Pulled about the City by His Dogs

permanently incapacitated physically, hitches a team of dogs to his wheel chair and drives in comparative ease. The vehicle is of the three-wheel type and is guided by a rod controlling the front wheel. The dogs are harnessed and placed on either side of the chair. Instead of attempting to drive them

with reins, he merely turns his tricycle in whatever direction he desires to proceed. The small brutes, alert to their duty, change their course as quickly as if their heads were pulled to one side or the other.

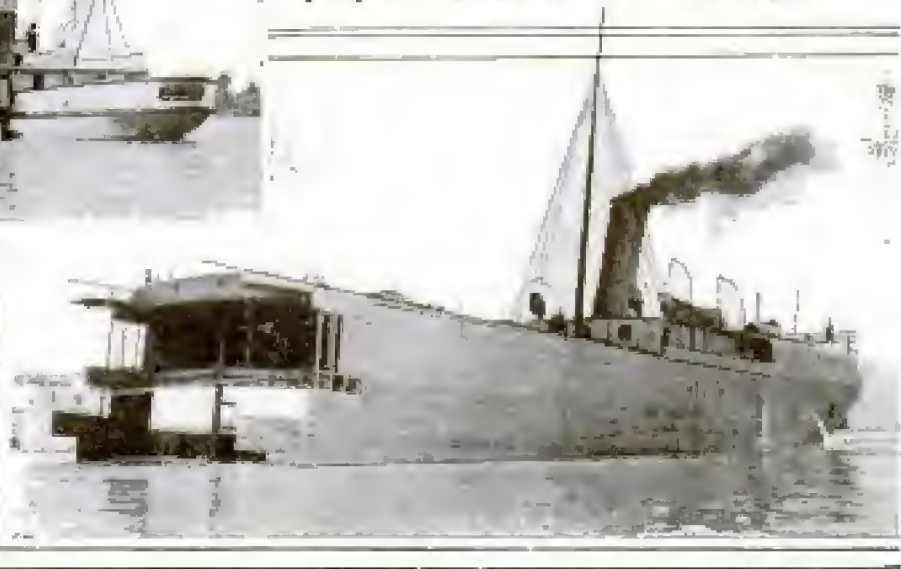
LAKE BOATS ENTER OCEAN STEAMSHIP SERVICE

Vessels for transatlantic and coastwise shipping have been in considerable demand since the opening of hostilities abroad. This has been responsible for the sale of a number of Great Lakes freighters to ocean steamship companies and the subsequent delivery of the ships at eastern ports. This has been done by taking the vessels through the Welland Canal, connecting lakes Erie and Ontario, and thence down the St. Lawrence River. The locks in the waterway, however, do not permit the passage of boats greater than 270 ft. in length, which has made it necessary in several instances to cut the freighters in two amidships and float the segments through separately. This was done with the "Matosa" recently, which has a length of 291 ft. The ship was cut apart at Port Huron, Mich., and the hull sealed with heavy bulkheads. The aft part of the vessel proceeded under its own steam as it was steered by a tug, while the bow section was towed. Concurrent with this four other ships were similarly prepared at Buffalo for the trip.



Above: Rear View of the Forward Segment, Showing Bulkhead Construction

Right: Aft Section of the "Matosa" Making Ahead under Its Own Steam



Herman Lieber,
338 Cetharins St.,
Philadelphia, Pa.

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H. W. Patton,
of The Detroit News,
Detroit, Mich.

Cont:

Cont: David Baxter,
410 East B Avenue,

POPULAR MECHANICS ⁴²⁹ Hutchinson,

BIG FARM-TRACTOR CONTEST HELD IN WHEAT BELT ^{Kans}



Above are Shown Two Types of Farm Tractors Which Took Part in the Kansas Contest



Long Line of Machines on Their Way to the Exhibition Grounds



All of the Tractors were Put through a Series of Severe Tests to Show Their Capabilities



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Nearly 100 farm tractors of different types and sizes were entered in a power plowing and cultivating contest which was held in Kansas soon after the wheat harvest. The meet took place on a 1,000-acre tract of land adjacent to Hutchinson, where separate plots were measured off for the demonstration of each machine. These spaces were allotted in accordance with the size and potential capacity of the various tractors. The exhibition, which was on a much broader scale than any previously held in the wheat belt, was attended by thousands of grain men and agriculturists of the Southwest. The tests were made especially interesting because of the muddy condition of the ground, due to the incessant rains which had caused great trouble during

the harvest season. They were given an opportunity in this way to compare at first hand the abilities of various patterns of machines, determine which types were best suited to meet their specific requirements, and see what these respective tractors could accomplish in soft fields. The machines represented a wide range in horsepower, weight, and cost; light tractors intended to do the work of two horses, and large engines built to pull nearly a score of plows at one time, appearing side by side.

Contributions of tobacco sent from this country for the use of French soldiers must be directed to the minister of war, who will distribute it at his discretion.

TRICK RIDER OF UNICYCLE ADVERTISES CLIENTS

271 Giving spectacular riding exhibitions on a high-seated unicycle in one of the streets of San Francisco, is the occupation of a trick cyclist of that city. Ad-



How the Cyclist, Wearing the Uniform of a Ship's Officer, Advertised an Antiquated British Convict Vessel Exhibited at the Water Front

vertising local business and amusement concerns constitutes his source of income, and this he does by wearing a placard on his back while startling the crowds as he apparently narrowly escapes death traps in the rush of traffic. He swerves and turns, winding in and out through the jam of motor cars, trucks, and wagons with ease, but nevertheless to the constant concern of onlookers. One day he wears a dress suit and advertises some tailor shop, while the next day he may display an advertisement of a different nature.

FOREST LANDS NOW HELD FOR ACTUAL SETTLERS

411 To prevent timber speculators from interfering with the settlement of the land by real farmers, the government is now withholding from agricultural entry all heavily timbered land in the national forests, until after the timber has been cut off. In each case the land will be opened to entry as soon as this is done, and settlers will be able to acquire it from the government under the homestead laws instead of having to pay from \$10 to \$60 an acre to speculators. The serious situation that confronts the government in this connection is shown in the fact that in Oregon and Washington alone more than 3,000,000 acres of fertile logged-off land are lying idle, being held at prohibitive prices by owners who acquired it for the timber, while at the same time hundreds of settlers are seeking homes in the adjoining national forests. The care that is being taken in classifying and disposing of the forest lands is well illustrated in the Kootenai Valley in Montana. Here a large river winds for 150 miles through the national forest. The valley is heavily timbered, but except for detached sections along the river it is too rough or too thinly covered with soil to be valuable for agricultural purposes. Instead of opening the whole valley to settlement, the Forest Service has painstakingly surveyed every little river bottom, island, and bench that contains enough arable land to support a home, and only these will be subject to entry. In this way more than 300 small farms have been carved out of the Kootenai national forest, while the bulk of the valuable timber land has been preserved for the national government.

When a recently invented massage vibrator is used the machine does not touch the person under treatment. The apparatus slips over the back of one of the operator's hands, transferring its motion so that the flesh is kneaded by the fingers.

Cont. D. S. Rockwell, Berkeley, Calif.

Cyclist: Walter E. Nilsson.

Information Sheet sent out by Department of Agriculture.

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International News Service
238 William St.

DEATH AND RUIN MARK PATH OF ERIE FLOOD

N.Y. C.



Remains of Twenty-Sixth Street Culvert, Which for Some Time Held Back a Lake of Water. Subsequently It Burst, Turning the Flood Loose on the Town. In Five Minutes Water Rose Four Feet



This Street Car was Struck by a Wall of Water and Overturned at the Intersection of Eighteenth and French Streets. The Flood Cut a Path 28 Blocks Long through the Heart of the City



The Flood was Caused by a Cloudburst Which Came after Three Days' Rain. Mill Creek, Dividing the City, Was Already Out of Its Banks. Picture Shows Debris in Seventh Street

French Street, Which Suffered Severely. Nearly 2,000 Persons were Made Homeless and 100 Buildings Swept from Their Foundations. Many Casualties and Large Property Damage Resulted



*Mfr. Regal Silver Manufacturing Co.,
1041 State Street, New Haven,
Conn.*

CURIOUS PERCOLATOR MADE WITH GLASS VESSELS

Application for patent rights has been made on a novel coffee percolator, the principal parts of which are de-



By Removing the Funnel and Strainer and Using the Bracket as a Handle, the Coffee may be Poured from the Flask

signed in glass. The device is as simple in construction as it is unusual in appearance. It consists essentially of a small-necked flask into which fits a glass funnel that holds a strainer.

These three parts are supported by a neat bracket, on the base of which is a place for an alcohol lamp. The required amount of water is poured into the flask, pulverized coffee placed in the funnel, and the small burner lighted. As the water becomes heated it rises into the funnel, coming in contact with the coffee. When all of the water has risen to the top the flame is extinguished, and the liquid allowed to filter back into the flask. The coffee is then ready to serve.

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TRACTION WHEEL OF BINDER RUNS IN BIG HOOP

When continued rains soaked his wheat fields to the extent that it was almost impossible to drive a binder across them, an Iowa farmer devised a novel and very effective means of overcoming the difficulty. A substantial wooden wheel, 9 ft. in diameter and bound by steel wagon tires, was constructed and so mounted as to form a track for the bull wheel of the harvester, thus preventing the latter from becoming mired. The rim of the big drum was 15 in. in width, which was sufficient to support the weight of the binder in soft fields. The device served its purpose well and enabled the farmer to save his crop.

Cont: *Nurse Marvini.*

*of Sentinel-Post,
Shenandoah, Iowa.*



The Large Hoop Forms a Track for the Bull Wheel and Prevents the Binder from Sinking into the Soft Ground

*Invention of H. R. Hogsett, of that
city*



NIGHT MOTOR-CAR RACES NOVEL SPEED CONTESTS

Motor-car racing at night under the glare of scores of powerful carbide lamps developed into a popular sport at the Brighton Beach track during the middle part of summer. A number of fast speed contests were run before large crowds which were attracted by the novelty of the events. By instituting a simple scheme of illumination, the one-mile course was lighted so that the spectators could see the racers at all times. This was accomplished by placing 185 dual-burner lamps, each capable of throwing a 12,000-cp. glow over a wide area, at frequent intervals. The outside of the track was margined with a 10-ft. white-canvas wall. Part of the lights were directed against this and others at the floor of the track. The cars in this way were silhouetted against the white background. Although the spectators were given an intensified impression of the speed, because of the black surroundings, the machines did rumble around the track in fast time, in one instance a lap being made in 49½ seconds.

Boiled sea water has been found by a French surgeon to be an excellent disinfectant for bullet wounds.

SURFACE-MEASURING DEVICE OF CONVENIENT FORM

To make easier the operation of measuring curved and irregular surfaces, a German inventor has constructed a mechanical device which is easily used and gives quite accurate results on certain kinds of work. It is provided with a wheel which, when



The Device Is Especially Useful for Measuring Curved or Irregular Outlines, but may Also be Employed on Straight Lines as Shown Here

moved over a surface in the same way as a tracing wheel, actuates two dials; one of which records the distance in yards, feet, and fractions of inches, and the other according to the metric scale. It can be used wherever a tape or rule is employed, as well as various places where these agents are of little value.

WIND-PROOF UMBRELLA MADE WITH SPECIAL RIBS

Ordinary umbrellas are often practically worthless after being blown wrong side out by a strong gust of wind, which is not infrequent in heavy storms. Because of this a new type of construction has been adopted by an eastern maker, who has designed a wind-proof umbrella. This is fitted with specially shaped ribs which permit the umbrella to be turned inside out without straining the connecting



If Turned Inside Out This Umbrella may be Pulled Back into Position without Injury

parts enough to break them. It is stanchly enough made, however, to hold its own under ordinary circumstances. In case it is turned wrong side out it may be drawn back to normal position without difficulty and without injury.

HARVARD MEMORIAL LIBRARY GREATEST OF ITS KIND

One of the finest library buildings* possessed by any educational institution has lately been completed on the campus of Harvard University. It has been erected at a cost of approximately \$2,000,000 as a memorial to Harry Elkins Widener, of the class of '85, who lost his life in the "Titanic" tragedy. It is intended to be used not only by undergraduates and research students of the institution, but as a place of special study for students at large. The structure is a mother's tribute to her son's memory.

The library will be the official home of the Harvard Commission on Western History, a body which is collecting material intended partly for the future use of historians and students of American ancestry and progress. At the present time the building holds some 206,240 volumes and about 423,000 pamphlets, while with a number of special collections also included the number exceeds 1,800,000 titles.

In its capacity the building is only slightly less than the New York public library or the Congressional Library at Washington, it is stated. Sufficient shelving space is available, it is estimated, for approximately 2,200,000 volumes.

The exterior of the structure is square and finished in brick. Within the quadrangle formed by its walls is a well which furnishes sunlight on all sides of the memorial hall. The interior, for the most part, is finished in weathered, quartered oak. The halls have marble floors, while cork is laid in the principal rooms to deaden sound. In all there are 70 private study rooms for the exclusive use of professors, and 300 reading stalls for students.

Early in July a French airman destroyed an Austrian submarine in the Adriatic by dropping a bomb upon it. A similar feat was previously accomplished by German fliers, who sank a Russian undersea craft.

Mfr: Hulse Bros. & Daniel Co.,
251 Church Street,
New York City



Above is Shown the Exterior
of the Harry Elkins Widener
Memorial Library at Harvard

Right: Beautiful
Memorial Fire-
place of Marble
Surmounted by
Portrait of
"Titanic" Victim

Below: Interior of the
Main Reading Room



STILTS USED BY PRUNERS IN ORANGE GROVES

Out in California an orange grower has found a practical use for stilts—one which is quite different from the ordi-



Using Stilts Instead of a Ladder While Pruning Orange Trees

nary function that small boys make them perform. During pruning season they are used instead of ladders for reaching the topmost branches of the fruit trees. It was observed that the continual shifting of stepladders consumed much of the workers' time. This prompted the suggestion that

stilts be substituted. Several pruners, who professed that they had been adept in the use of stilts in their younger days, were provided with the devices. After a small amount of practice they made excellent progress and were able to do considerably more work than they had been capable of doing while using ladders. When the pruning is being done part of the men work on stilts, taking care of the upper part of the trees, while the others remain on the ground.

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POPULAR MECHANICS READ IN CHINESE ACADEMY

Popular Mechanics Magazine is in no sense intended as a textbook, yet this is the use which is being made of it in Soochow Academy, at Soochow, China. The members of the senior class use the magazine instead of the usual classics in the study of English. The reason given for this is twofold. The instructors have found that the pupils make better progress when matter is written in a simple, direct style, than they do when reading more involved literature such as that taught in our schools. On the other hand, modern mechanical progress is more or less unknown to the average Chinaman. So, in studying Popular Mechanics Magazine, the boys not only become acquainted with the language of the American home, but also with the current industrial and scientific achievements of the world.



Group of Senior-Class Boys of Soochow Academy. Where Popular Mechanics Magazine is Used as a Textbook in the Study of English

Cont. - E. R. Maury.
Irvine, Orange Co., Calif.

Cont. Roger Wolcott,
Soochow Academy.

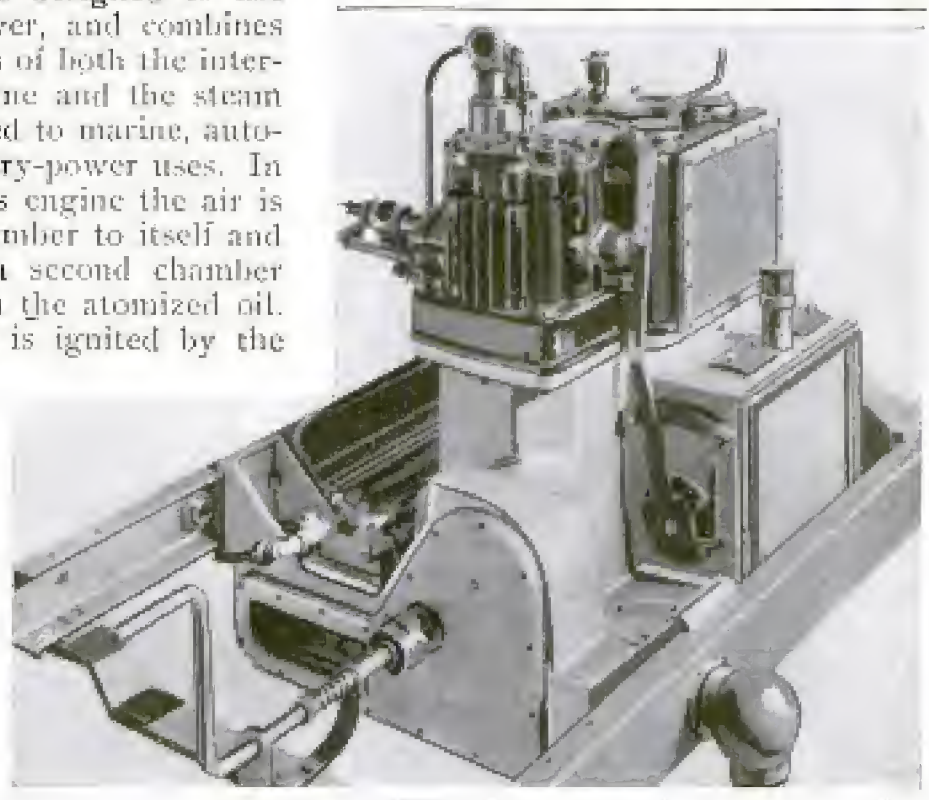
Marine Journal, July 10, 1915

NEW ENGINE WORKS ON GAS AND STEAM

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Trans Engine Co., 218 West 26th St., New York City

A motor of novel type that has just been brought out is designed to use any fuel oil whatever, and combines some of the features of both the internal-combustion engine and the steam engine. It is adapted to marine, automobile, and stationary-power uses. In the operation of this engine the air is compressed in a chamber to itself and is then passed to a second chamber where it mixes with the atomized oil. When this mixture is ignited by the electric spark, the resulting hot flame is utilized for forming a measured quantity of water into steam, a process that greatly reduces the temperature of the gases formed by the explosion. The steam and these gases then enter a cylinder much like that of a steam engine, where their expansive force furnishes the power for driving the piston. With this arrangement the speed of the engine is easily controlled by a throttle, in exactly the same manner as that of a steam engine, while reversing is accomplished by the simple process of swinging the reversing lever. The engine can be started directly on oil without any previous heating. Since the gases for the entire engine are formed in one chamber, only one spark plug is required, whatever may be the number of cylinders.



In This Motor Both Gas and Steam are Formed and are Used in Cylinders Like Those of a Steam Engine

Shipping Illustrated, Aug. 14, 1915

RUSSIA BUILDS RAILWAY TO ICE-FREE ARCTIC PORT

468

According to newspaper reports the double-track railway which Russia is building from Petrograd through Petrozavodsk to Kola and Ekaterina on the Arctic Ocean is now practically ready to be placed in operation. The purpose of the new line is to utilize an arctic port that can be kept open the year round. Ekaterina is located about 250 miles easterly from North Cape, the most northerly point of Europe. The mild winter climate of this port and the adjacent seas is due to the Gulf Stream which, after cross-

ing the Atlantic and striking the north coast of Norway, divides near North Cape, one arm flowing easterly along the coast of the Arctic Ocean and keeping the waters practically clear of ice to a point a few miles east of Ekaterina. While this port is open to navigation throughout the year, Archangel, located several hundred miles south and east at the southern end of the White Sea, is closed to navigation early in October and remains closed until some time in May. In view of the war, the importance of this new connection can hardly be overestimated, since it will give the Russians a direct and sure communication with the Atlantic.

TRIUMPH OF WINGS IS THEME OF MARINE FLYING TROPHY

To promote aerial navigation in America, a large silver trophy has been offered for over-water flying. It be-

five points is made to the record of a pilot for each passenger he carries.

The trophy is emblematic of the victory of the flying boat over the dominion of Neptune, the ruler of the seas, and Boreas, the master of the winds. It shows a craft of this type escaping the outstretched arms of the elements personified. It is nearly four feet in height and is 2 ft. 7 in. in diameter.

THE PLATTSBURG MILITARY-INSTRUCTION EXPERIMENT

Several hundred prominent business and professional men of Boston, New York, Philadelphia, and other Atlantic-coast cities took part during August in one of the most interesting military experiments that has been undertaken in this country.

At Plattsburg, which is in the northern part of New York State, the men, most of them college graduates and all paying their own expenses, under the direction of Maj. Gen. Leonard Wood, were given a month's training in the manual of arms and practices of warfare. The purpose of this encampment, quite unique in America, was to give this body of citizenry an understanding of the fundamental principles of modern warfare and an insight into the business of the soldier. In the four-weeks' course was condensed what the average recruit would ordinarily be given in a year's time.

The men were put through as thorough a workout in field maneuvers, trench fighting, and drilling as the brevity of the time would permit. From sunrise until one o'clock in the afternoons they were kept on the go, while following this hour they were given exercises in signaling, map reading, and similar things, and heard lectures upon such subjects as bridge construction, trench warfare, and the installation and operation of electric lines in the field. The whole period was spent in hard work and a total absence of revelry. The experiment was based on the theory that college men and efficient business and professional experts are capable of a quicker response



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The Triumph of the Flying Boat over Neptune and Boreas

comes the property of any recognized club whose members win it three consecutive years. The rules of each succeeding contest will be changed in accordance with the advancement made in aeronautics during the intervening periods.

The first stage of the competition will end October 31, this year. Its winner will be the one who flies the greatest distance over water during 10 hours of one day. The conditions governing the measurement of this distance prescribe that the airman who flies in a broken line will be penalized a certain part of the total for the advantage he obtains over those who drive in a straight line from the starting to the finishing places. An addition of

Photo - - Theodore E. Starr, Inc.
 Fifth Ave. & 47th St.
 New York City
 Flying 7/19/15



Instructing the
Plattsburg
Contingent of
Eastern Business
Men in the
Mechanism and
Proper Handling
of the Army
Rifle



Group of Khaki-Clad New
Yorkers and Bostonians being
Taught How to Advance
When under Fire of an Enemy



Training the Men in the
Manual of Arms: From Sun-
rise to One o'Clock Each Day
They were Put through Their
Paces. Manoeuvring, Drill-
ing, and "Fighting"



COPYRIGHT, LUPTON

The New Dam at Gallipolis, Ohio, One of More than 50 Dams Which

to military training than is the average raw recruit, and therefore able to absorb in a comparatively short time a really valuable understanding, so that in the event of necessity they could be whipped into shape to serve as officers for a volunteer army.

The success of the encampment has been exceptional. The result of the work has also attracted nation-wide attention and caused other sections of the country to fall in line for similar courses of instruction. Notable in this movement is Chicago. At the present writing a large number of prominent men in that city and surrounding points have signified their intention of attending an encampment to be held at Fort Sheridan, Ill., between September 20 and October 18. This course will be conducted like that in New York State.

THE GALLIPOLIS DAM ACROSS 398 THE OHIO RIVER

To provide a minimum depth of 9 ft. from Pittsburgh to Cairo, the government is gradually installing a series of dams along the Ohio River between these two points, and this construction, taken in connection with the other work that is being done for the improvement of navigation, constitutes one of the biggest jobs of river improvement ever attempted in this country. For completing this work, which is to make the Ohio River navigable at all stages of water, a total of over 50 dams will be required. The latest of these dams to be completed is the one at Gallipolis, Ohio, about 200 miles up the river from Cincinnati. In construction it is much like the dam at Fernbank, near Cincinnati, which was described in the October, 1911, number of this magazine. Both dams are of the wicket type, a construction which permits a practically unobstructed flow during high water, but which can be used for forming a navigable pool during low water. The Gallipolis dam has a lock big enough to handle the largest river steamers afloat, this lock being 110 ft. wide and 600 ft. long. The section of the dam adjacent to the lock is the navigable pass. This is 600 ft. long and is made up of wickets, or gates, which can be raised to form a

484 YELLOWSTONE PARK NOW OPEN TO MOTOR CARS

After years of agitation the government has at last consented to open the Yellowstone National Park to motor cars. The official time for the opening was set for midnight of July 31, 1915, but by special arrangement cars were permitted to enter at Gardiner and go as far as the Mammoth Hot Springs Hotel so that they could start a tour of the park at sunrise the next day.

J. C. Lupton,
328 Second Ave., Gallipolis, Ohio.

Motor Cars,
8/12/1915



are to Make the Ohio River Navigable at All Stages of Water

dam or laid flat on the river bed. When raised, these wickets stand practically 17 ft. above the bottom of the river. Next to the navigable pass come two bear-trap dams, each 91 ft. long, the remainder of the river being closed by a second wicket section, 272 ft. long. During high water all these sections are laid flat on the river bed, leaving the river entirely clear, except

for the piers at the bear-trap dams. Under these conditions the river steamers use the navigable pass as a channel. When the water is at a low stage, the sections are raised and the steamers use the lock for passing the dam thus formed. The bear-trap dams serve as a spillway that can be easily raised or lowered to correspond to the amount of water passing down the river.



415 COPYRIGHT, UNDERWOOD & UNDERWOOD

BRITAIN SHIPS MILLIONS IN GOLD TO NEW YORK CITY

WHAT was without doubt the largest single consignment of gold ever transported across the Atlantic in one bottom was recently shipped from England to New York bankers. The treasure amounted to \$52,000,000, two-thirds of which was in gold and one-third in securities. It was carried in a battleship escorted by a flotilla of destroyers to Halifax, where an express company took it in charge. The above photograph shows the gold being carried under guard in 23 motor trucks to the subtreasury.

Underwood & Underwood,

*417 Fifth Ave.
N. Y. C.*

Copyrighted material

FLY-CATCHING SYNDICATE LAUNCHED AT ATLANTA

Fly trapping, strange as it may sound, has become a recognized business at Atlanta, Ga. In an attempt to



This Shows One of the Syndicate's Traps Set at the Curb on an Atlanta Street

rid the city of flies the municipal authorities have contracted with a fly-catching syndicate to pay a bounty of 25 cents a quart for the pests. As a result the firm has placed tent-shaped traps along some of the business thor-

oughfares and in other places, is maintaining them, and making periodical collections. It is stated that since the devices were installed each has been catching an average of three or four quarts of flies daily.

— 434

MUNICIPAL CAMPING GROUND FOR VISITING MOTORISTS

In one of the municipal parks of Denver, several acres of ground have been fenced and reserved as a camping place for motor tourists. The plan has met with such pronounced success that a permanent sewerage system is being installed. Motorists drive into the pretty wooden inclosure and are provided a clean, inviting place, safe from intrusion, where they may pitch a tent, build a fire, and remain as long as they desire to accept the city's hospitality. When their camp is established they may come and go as they wish, with the assurance that their personal belongings are being protected by guards. The ground is intended for tourists from other states who are making outings of their trips, and prefer camp life to the conveniences of hotels while in the city.



CORRIGER, CHESBROOK & UNDERWOOD

WESTERN CRAFT WINS HYDROPLANE MEET

"MISS DETROIT," the speedy little hydroplane of a Detroit association, skimming over the water of Manhasset Bay, Long Island, during the recent contest for the gold challenger cup in which it captured the honors in the third and final race. The boat easily outdistanced its two rivals and covered the 30-mile course in 1 hour, 3 minutes, and 34 seconds.

Mae Kenzig, Barnes,
76 E. Linden St.,
Atlanta, Ga.

Cont: Roger Wolcott,
335 S. Symmes Bldg.,
Denver, Co.

J. E. King - 202 S. Winnetka Ave., Dallas.

Underwood & U. - 417 Fifth Ave., New York City.

HURRICANE WORKS HAVOC ALONG GULF COAST

476



Heavy Property Damage and Many Fatalities Were the Toll at Galveston. This Shows Ruins along the Sea Wall Boulevard. Monuments were Swept from the Sea Wall

Residence on the Beach at Fourteenth Street Wrecked by the Waves. It can Hardly be Estimated What would have Happened had the City Not had the Protection of the Sea Wall



One of the Freaks: Wreck of 200-Foot Schooner Which was Lifted over the Sea Wall and Hurled Inland with Such Force That It Broke into Pieces



At Houston, Texas: The Wreck of One of the Oldest Brickyards in the State. Several Million Dollars' Damage was Worked in the City by the Hurricane

447

RAISING OF THE ILL-FATED "EASTLAND"

JUST three weeks after capsizing at its dock and carrying more than 800 picnickers to their death, the ill-fated steamship "Eastland," its hull patched and decks stripped, was raised out of the mud of the Chicago River and towed into the "north branch."

A number of perplexing situations confronted the engineers in charge of the salvaging. The majority of these were more exasperating than serious, however, and served principally to delay the final operation of righting the vessel. The question of supplying sufficient power to float the half-submerged ship did not prove so troublesome in the end as did much of the preliminary work, although this constituted one of the interesting phases of the undertaking.

It will be remembered that the vessel listed away from its berth and turned over on the port side, submerging about two-thirds of its beam. After as many of the bodies had been recovered as could be reached, the funnels, spars, and all other deck obstructions, were cut off by divers and sealed. While this was being done the openings which had been ripped in the starboard side of the ship, by rescuers with oxyacetylene torches, were patched. Much difficulty was experienced in closing the portholes and gangways on the under side, for these were obstructed by great piles of luggage, ship furniture, and debris. The closing of the hatches was not so difficult.

Before the water could be pumped out of the vessel it was necessary to seal and reinforce the aft bulkhead, which had been broken through in attempts to penetrate the interior. This work, which presented one of the trying problems, had to be done by divers. The entire partition, approximately 26 feet long and 9 feet high, when in normal position, was reinforced by 2 by 10-in. planks lapped one over the other. Another thickness of lumber was placed over this, the planks crossing the first ones. Canvas was subse-

quently stretched over the whole to prevent leakage. The sealing of this wall prevented an inrush of water from the stern of the boat when the centrifugal pumps were started to expel that in the main part of the hull. After a part of this had been pumped out, however, the tremendous pressure against the bulkhead threatened to cause it to collapse. It was apparent that elaborate bracing was required to forestall this, so divers were again sent beneath the water to do the work. Beams were extended diagonally between the bulkhead and the deck, much of the carpentering being done with the use of block and tackle and pneumatic instruments.

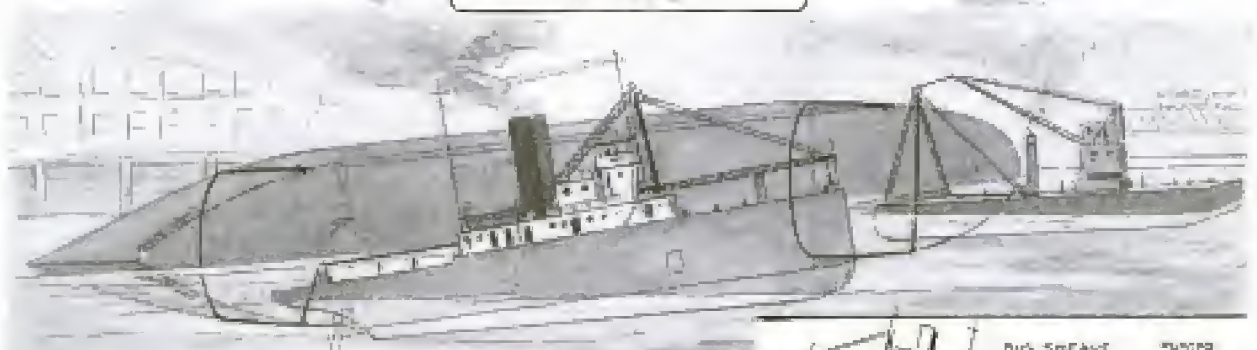
The shifting of the coal in the bow to the port side, and the leakage of some of the holes which had been inadequately sealed, were also matters which contributed to delay the work. The ballast tanks on both sides were filled in order to provide a rolling weight which would assist in righting the vessel and in balancing it when raised.

The "Favorite," a wrecking tug, was anchored at the bow of the "Eastland," while aft, near the stern, a large pontoon carrying a heavy hoisting apparatus was moored. Cables were extended entirely around the hull of the sunken ship from both of these vessels and secured to the starboard, or upturned, side. The forward cable was fastened to the iron standard streak and passed over a big sheave at the stern on the "Favorite." This line was then wound on a large winch. The aft cable reaching from the pontoon was fixed to the "chop" forward of the stern.

When everything was in readiness to attempt the actual righting of the vessel, both the "Favorite" and the pontoon were flooded until the tug was lowered 8½ ft. and the latter 9 ft. The weight of the "Eastland" is about 1,200 tons. Its boilers held approximately 40 tons of water and its hold a large quantity of coal, while a considerable amount of water also remained in the hull. This was the load which had to



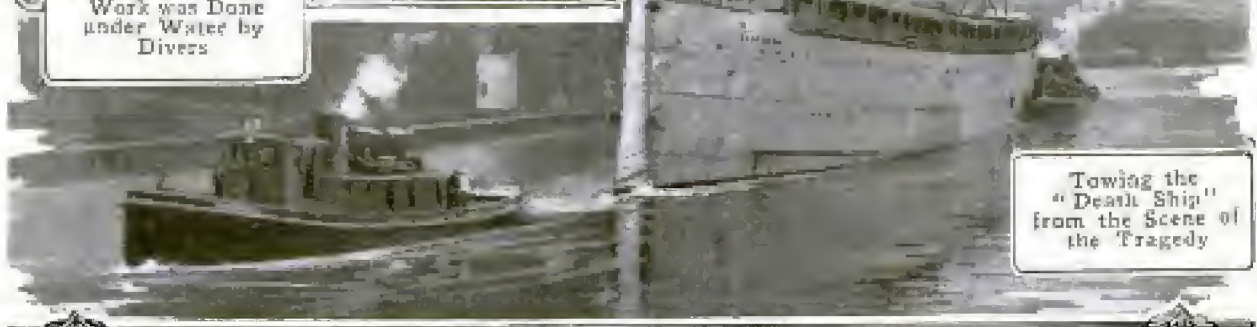
This Shows the "Eastland"
Partly Raised and the
Relative Positions of the
"Favorite" and the Wrecking
Pontoon Which Accomplished
the Work



The Upper of the Above Diagrams
Illustrates the Manner in Which the
Cables were Run from the Tug and
Pontoon and Anchored on the Starboard
Side of the Half-Submerged Ship. The
Lower Drawing Indicates How the Cable
was Extended to the Winch Aboard the
"Favorite"



Bracing of the Aft
Bulkhead: The
Work was Done
under Water by
Divers



Towing the
"Death Ship"
from the Scene of
the Tragedy

be negotiated in order to keel the ship, which, it was estimated, would right itself upon being pulled to a 45° angle. When the engines had drawn up the cables until the tug and pontoon had been pulled as deeply into the water as was advisable, pumps were started exhausting the water from both. It was the added lifting power given by the natural buoyancy of these two vessels, coupled with the work of the en-

gines, that finally brought up the "Eastland."

Instead of righting itself at 45°, however, the death ship had to be pulled to approximately 70°. Before this point was reached the water was taken from the boilers and still more expelled from the hold. The ship was not completely trimmed, however, until the coal and wreckage, thrown to the port side, had been moved.

436 FLOTILLA OF MOTORBOATS RECOVERS TORPEDOES

Four stanch motorboats of a seaworthy, fast type form a fleet of torpedo chasers which is being used off Greenport, L. I., where marine projectiles are tested. The flotilla was built especially for this service. Each unit is constructed the same as its sister

and have heavily armored guards. The steering station is placed alongside of the helmsman, who is protected by a windshield and has full control of the boat.

Barbed wire, painted a foliage green to make it invisible, is being used for wire entanglements by the armies of Europe.



The Flotilla of Speedy Torpedo Chasers at Work on the Testing Course off Greenport: The Vessels Are Very Stanch and Able to Withstand Quite Rough Water

boats, so that the quartette is well mated for maneuvering in various formations. The work of testing torpedoes consists in firing them at various angles over a determined course. The "chasers" are distributed at different points to recover the missiles as they are shot out through the water, and return them to the firing station. The boats have been built to withstand a fairly heavy sea. At the same time each of them has a speed of 13 miles an hour. The over-all length is 40 ft.; the beam, 7 ft. 9 in., and the draft, 2 ft. 10 in. The craft are made of oak scantling and cedar planking,



Chasing a Torpedo: These Little Launches Hunt the Marine Projectiles After They are Fired and Return Them to the Testing Station

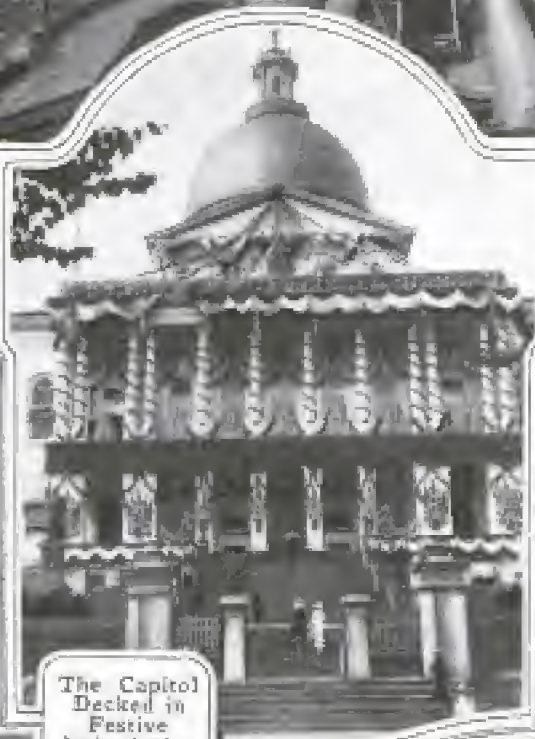
Used by E. W. Bliss & Co.,
Greenport, N. Y.

BOSTON IN GALA DRESS FOR GOVERNORS' VISIT

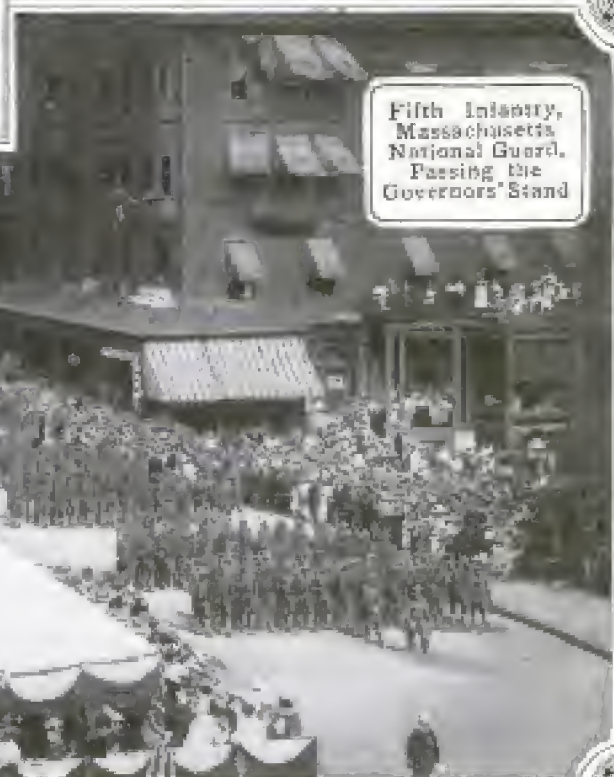


Destroyers Passing
Before Governors' Party
aboard the
"Wyoming"

DURING the annual convulse of state executives which was held this year at Boston, the Atlantic fleet and Massachusetts National Guard were reviewed. The party, as the guest of Secretary Josephus Daniels, was carried by the "Wyoming" from Charleston Navy Yard to a position off Boston Light. Following the review the flagship was "attacked" by a flotilla of destroyers. When the "enemy" was sighted the governors were given an exhibition of fast naval maneuvering under Admiral Fletcher, who stood on the bridge. Blank cartridges were fired at the approaching vessels, one of which dasked up within 3,000 yards of the ship and discharged a dummy torpedo that missed its mark by a few feet.



The Capitol
Decked in
Festive
Attire during
the Con-
ference of
State
Executives



Fifth Infantry,
Massachusetts
National Guard,
Passing the
Governors' Stand

Instrument made to order by and picture contributed by: W.C. Parrish, 191 Union Ave. N., Portland, Oregon.

American Glass Casket Co., Oklahoma City, Okla.

50

STAGE SOUND CABINET MADE IN FORM OF TRUNK

For the use of a traveling theatrical company, a novel compressed-air and electric sound cabinet has been built,



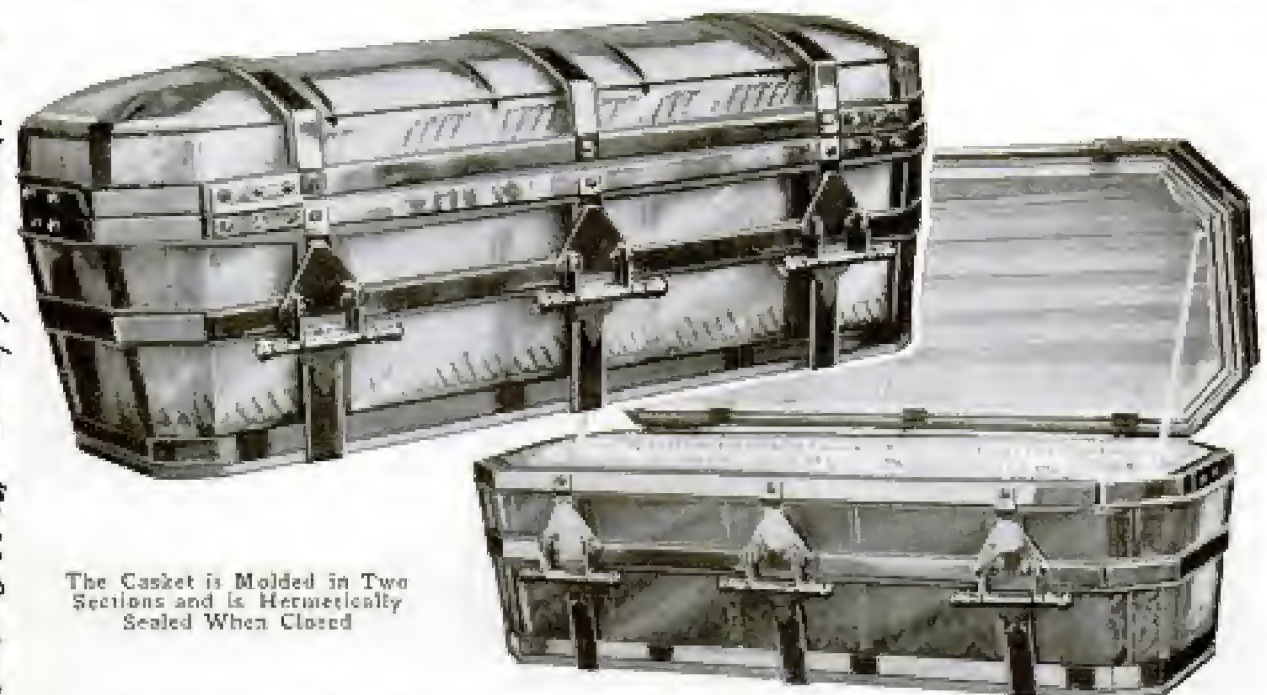
The Cranks Shown at the Front may be Removed Quickly and the Top Folded Down and Locked

which produces any one of a large number of different noise effects on the stage. It is constructed compactly in the form of a trunk which in a moment's time may be closed and locked preparatory for shipment. It is especially valuable for a troupe playing a

some by electricity. With it the characteristic noises of a motor car, a locomotive exhaust, air-brake release, safety valve, railway-engine whistles, boat whistles, fire-engine whistle, siren, sawmill, wind, water, train bell, cow bell, telephone bell, electric house bell, buzzer, dining-room bell, and a telegraph instrument may be made. A second trunk contains an air compressor which furnishes the air power.

CASKET IS MADE OF GLASS BOUND BY METAL 401

Made of two pieces which are bound together by heavy metal bands, a glass casket has been invented which will soon be introduced for burial purposes. This serves both as a coffin and vault, as it requires no protection against the chemical action of the earth. When closed it is hermetically sealed and is proof against both air and water. The two sections are molded in heavy glass, which gives the casket great strength. Its general form is the same, practically, as that of other burial receptacles. The chief point advanced in its favor is its obvious qualities of durability. The casket is to be made



The Casket is Molded in Two Sections and is Hermetically Sealed When Closed

long repertory. Inside of it are several different instruments, some of which are operated by air pressure,

in various sizes and grades. The cost will vary largely according to the quality of the trimmings.



Huge Touring Van with Top in Folded Position

Starting on the Transcontinental Tour in One of the Most Elaborate Prairie Schooners That Ever Headed for the Plains



LUXURIOUS BIG "GYPSY VAN" ON CROSS-COUNTRY TOUR

What is probably the most elaborate prairie schooner that ever started on a transcontinental trip in this country, recently left Long Island bound for San Francisco with a party of nine persons. It is a large, double-decked, richly appointed motor bus which was built especially for this tour by a New York financier.

The interior of the car is 21 ft. in length, 7½ ft. wide, and 6½ ft. high. The space is divided into three compartments. The first of these is occupied by two chauffeurs and is a roomy vestibule which almost in a moment's time may be converted into a very comfortable bedchamber. Back of this is the main room, some 10 feet in length. The arrangement of this is much like that of a Pullman car. During the daytime it is used as a living room, while at night, with its six berths made up, it offers nearly the same conveniences as are afforded on a well-equipped overland express. There are electric lights, hot and cold running water, shower baths, and other similar accommodations. The room is fitted with upholstered furniture, has a library and writing desk, boasts a talking machine, and is shaded by broad

awnings. Back of this compartment is an electric kitchen in which is built a compact refrigerator.

The top of the "schooner" is reached by steps leading from the rear compartment. It is covered with a collapsible top and is used as a dining room. It is fitted with lockers, and also offers sleeping facilities. A motorcycle is carried here for emergency purposes.

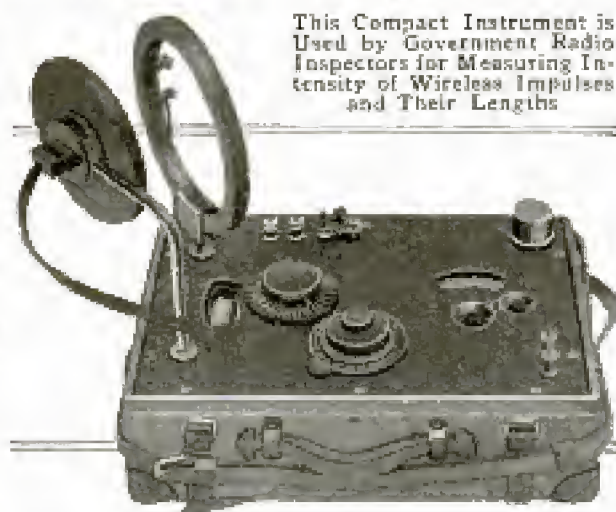
The car is equipped with a six-cylinder, 60-hp. motor. It was built especially for the bus, and has nine forward and three reverse speeds. A folding bridge is carried for emergencies.

MEASURING WIRELESS WAVE LENGTH AND INTENSITY

For the purpose of measuring the logarithmic decrement, or the reduction of intensity and the diminution of wave length of vibrations emitted by a wireless transmitter, a direct-reading instrument has been developed which is now being used by the radio-inspection service of the Bureau of Navigation. The government regulations concerning the operation of wireless stations are rigid and it was to facilitate the work of ascertaining whether they are observed that the invention of this apparatus was prompted. The Federal rulings are of importance because by

sending out single-frequency oscillations from a station a more selective receiving equipment may be employed. This enables sharp tuning and lessens interference from other plants.

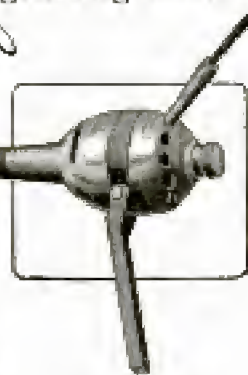
This Compact Instrument is Used by Government Radio Inspectors for Measuring Intensity of Wireless Impulses and Their Lengths



The decremeter, in simpler terms a decrease meter, enables measurements of variations in intensity to be made quickly and accurately. Instead of its being necessary to do the work according to laboratory methods, it is with this instrument possible to go aboard a ship, where conditions make the former method of measurement difficult, and do the work readily.

NEW PORTABLE ELECTRIC GRINDER 179

A portable electric grinder adapted to grinding centers, reamers, cutters, and dies, has been invented and placed on the market. This grinder weighs only 5½ lb., operates at 10,000 revolutions a minute and is capable of grinding holes up to



in. in depth. An arm is provided for supporting it from the slide rest of a lathe, and it can be used both for external and internal work. The grinder is driven by a ¼-hp. motor which operates on either alternating or direct current.

Electrical World,
June 19-1915

SUCCESSFUL GAS TURBINE MADE IN SWITZERLAND

The development of the gas turbine to a state of practical efficiency is reported to have been accomplished at Baden, Switzerland, where experiments have been under way for a considerable time. Since a gas turbine occupies only one-third the space required for a gas engine and weighs only about one-fourth as much, its importance can hardly be overestimated, especially in its application to aeroplanes and dirigibles. This was fully realized before the outbreak of the war, and the first successful use of the turbine is likely to be in connection with aircraft used in military service.

In this turbine a number of bottle-shaped explosion chambers are arranged radially with reference to the shaft, so that the gases resulting from the explosion in each chamber strike against the turbine blades. Air and gas in measured quantities are forced into each chamber in turn, a spraying apparatus being used when gasoline or other volatile liquid fuel is used. This charge is fired by an electric spark, and at the right instant the valve in the nozzle of the explosion chamber opens, and the full force of the expanding gases is brought to bear against the turbine blades. When the force of the explosion has been spent, a blast of air is forced through the chamber for the purpose of scavenging. It is planned to use the exhaust gases for raising steam in a small boiler, the steam thus produced being used to drive the air and gas pumps. The making of turbine blades that will stand the destructive effect of the hot gases, the greatest difficulty heretofore experienced in making a gas turbine, is said to have been entirely overcome in the making of this turbine. The turbine will probably be used immediately with military aircraft, but it is not likely that it will be exploited in a commercial way until after the readjustment of industry following the end of the war.

Taken from "The Iron Age" 7/22/15 p. 185
 Developed at works of the Brown-Boveri & Co.
 Baders,
 Switzerland.

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UNDERWOOD & UNDERWOOD
 Street Scene in Canton,
 China, during the July
 Deluge Which Rendered
 Thousands of Inhabitants
 Homeless and Claimed
 the Lives of Many Others



The Raft Supports
 the Bodies of Victims
 Recovered from the
 Water. Which in
 Some Places Rose to
 a Depth of 15 Feet.
 Incendiary Fires
 Added to Suffering



The Flood Was One of the Worst That has
 Ever Visited Canton. Hundreds of Shops in
 the Principal Streets were Ruined. Volunteer
 Guards and Soldiers Had Difficulty in Coping
 with Organized Bands of Thieves Who
 Looted and Burned as They Went

Underwood & Underwood.

Cord: Alan D. Witkowski, Chicago, Ill.
A. S. Spaulding, 5424 E. View Park, Chicago, Ill.

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POPULAR MECHANICS

SIMPLE SCRUBBING DEVICE FOR GOLF BALLS

For cleaning golf balls which are grass-stained or dirt-covered, a convenient little machine has been de-

"CHEROKEE BALL WASH-ER"



signed which is intended to be mounted on a tee box where it is available for the use of players. It consists of a hemispherical case holding three circular brushes, so mounted that they may be revolved rapidly by turning a crank, which is fixed at one side. The bowl is filled with soapy water, a ball is placed within it and in contact with the bristles, and the cover closed. A few turns of the handle are sufficient to do the work.

482 FLEET CARRIES WATER FOR GALLIPOLI TROOPS

One of the hardest problems for the British and French forces operating on the Gallipoli Peninsula is that of obtaining an adequate supply of water suitable for drinking. There is little water to be found on the peninsula, and what there is, is in most cases too badly polluted to be used. As a result it is necessary to transport the water long distances by sea, some of it coming from Greece and the Aegean

Islands, but the most of it being brought from distant places like Malta and Egypt. An enormous fleet of tank ships and barges is constantly engaged in this work. Usually the water is unloaded in the crudest manner. When the sea is calm ordinary ship's boats are scrubbed thoroughly, towed alongside and filled to the gunwales with the fresh water. These boats are towed ashore, and the water is bailed out with buckets and carried to the front in enormous Greek wine casks lashed to mule carts. At the front the British use steel-armored water carts, while the French engineers have built underground cisterns each capable of holding 1,000 gal. These tanks are protected by bomb-proof coverings.

LARGE SECTIONS OF ALASKA SUITED TO FARMING

As the result of a survey carried out by the Department of Agriculture, covering the climate, soil, and other conditions bearing on the possibility of agricultural development in Alaska, it has been found that there are millions of acres of land in that far northern country that are climatically and topographically suited to farming. These farming lands are all located in certain plainlike valleys, which have a mild summer climate, long hours of summer daylight, and a good quality of soil. In some sections of the territory food products in considerable quantities and of many kinds are already being raised. Farmers, however, are compelled to live under pioneer conditions, and this situation will probably continue for some years to come. Good roads are scarce, and settlement is practically limited to the regions of mining camps which at present furnish practically the only market for farm products.

Work on the first of a series of locks and weirs that will make the river Murray in southern Australia navigable and will supply irrigation for about 1,500,000 acres of land was begun in June, 1915.

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Information Sheet issued
by U. S. Agricultural Dept.

COMBATING POISONED GAS ON BATTLE FIELDS



Red Cross Workers behind the German Lines Resuscitating Unconscious Soldiers Who have Succumbed to the Heavy Gases



Charging Allied Trenches under Cover of Gas Cloud



In an Advanced French Trench: A Sentry is Sounding a Gong to Warn the Soldiers of the Approach of an Asphyxiating-Gas Cloud and the Necessity to Don Respirators

Equipped with Field Apparatus for Reviving Gas Victims and Protected against Asphyxiation by a Respiratory Mask





The Effect of German Artillery Fire upon a Cabin on the Eastern Front Which was Occupied by Russian Troops. A Bursting Shell Practically Wrecked the Dwelling and Killed the Men, the Bodies of Several of Whom are to be Seen in the Debris

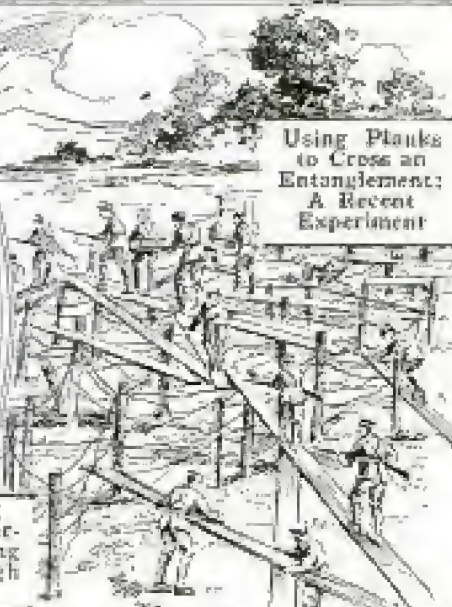
BUILDING AND RAZING WIRE ENTANGLEMENTS



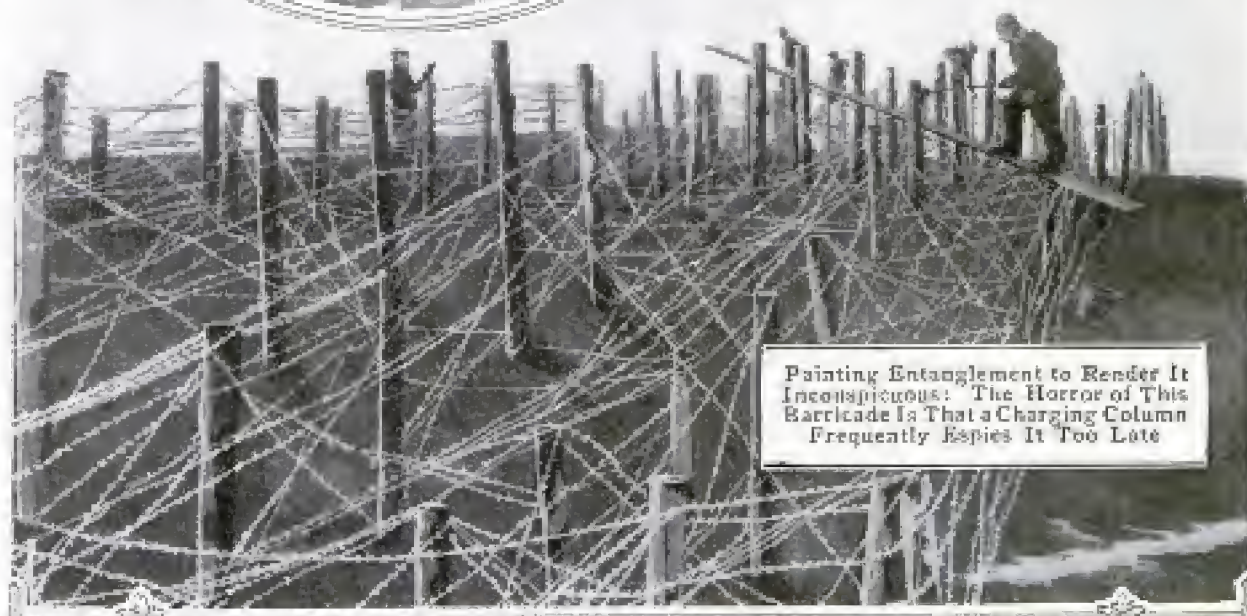
An Improved
Barbed-Wire
Factory in
Germany
Where Rus-
sian Prisoners
are Kept at
Work



Italians Clearing
Corada Pass of Bar-
ricades by Driving
Wild Cattle through
Them



Using Planks
to Cross an
Entanglement:
A Recent
Experiment



Painting Entanglement to Render It
Inconspicuous: The Horror of This
Barricade Is That a Charging Column
Frequently Espies It Too Late

FIGHTING AT CLOSE RANGE WITH HAND GRENADES



The Use of Periscopes in Connection with Rifles Is a New Development in Trench Warfare Peculiar to Modern Fighting. This Shows How French Soldiers Are Able to Snipe Off the Enemy without Exposing Any Part of Their Bodies to a Return Fire. The Rifles are Supplied with Auxiliary Stocks and Periscopes Which Allow the Soldiers Using Them to Remain Completely Out of Sight While Shooting



Bracelet Igniting Device: At Close Range a Hand Grenade Is More Destructive than a Rifle



French Soldier Firing Luminous Rockets to Light the Enemy's Trenches at Night

AND BOMBS IN THE BATTLE TRENCHES OF EUROPE

In Many Sections of the War Zone Enemy Intrenchments Are Only a Few Rods Apart. This Cramped Condition has Made Hand Grenades and Various Forms of Trench Bombs Very Important Agents of Human Destruction. Some of the Former Devices Are Spherical in Shape and No Larger than Baseballs. This Type Usually Explodes upon Contact and, Like Others, Is Growsomely Effective at Times.



CORRIGAN UNDERWOOD & UNDERWOOD



Rocket Throwing Device: The Fuse Here is Ignited before Throwing the Grenade



Odd Form of Trench Bomb Employed by the French against Strongly Fortified Intrenchments

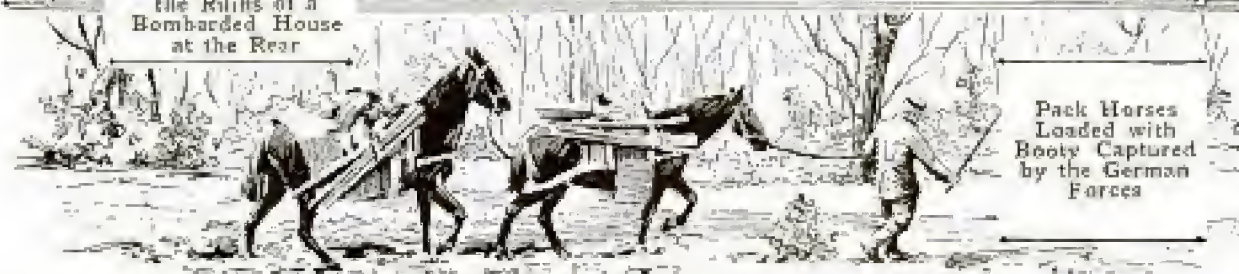


Potato-Masher Type of Grenade: Soldiers Carry These Strapped to Their Belts

GERMANY'S TRIUMPHANT ARMY IN GALICIA



Russian Dead
Strewed behind
Improvised Breast-
works Hastily
Thrown Up with
Lumber Taken from
the Ruins of a
Bombarded House
at the Rear



Pack Horses
Loaded with
Boots Captured
by the German
Forces



The Victors Inspecting the Spoils:
This Shows Some of the Equipment
and Ammunition to Which the
Germans Fell Heir after the Russians'
Last Stand in Western Galicia

SIDE LIGHTS ON WAR FROM GERMAN VIEWPOINT



German Sentry on Raft Patrolling Shore Line in Flanders While Exposed to the View of Snipers



With the Aid of an Oxyacetylene Torch This German Officer is Cutting the Steel Supports of a Bridge in Order to Hamper the Enemy



Two Members of a Pioneer Corps of the Kaiser's Forces Decked in Their River Togs. It Is the Duty of These Men to Go Ahead of a Column and Reconstruct Wrecked Bridges and Restore Other Avenues of Communication. The Buoyant Uniforms Allow Them to Sit in the Water and Move About

NEW HELMETS PROTECT FRENCH FROM SHRAPNEL



At the Left is Shown One of the Old Ironsides of Cromwell's Time. The Helmet Worn by This 17th Century Soldier has been Employed as a Pattern for the New French Helmet Adopted Recently for Use on the Firing Line as a Protection against Shrapnel and Spent Fragments of Shells. It is Made of Thin Chrome Steel and Weighs 21 Ounces

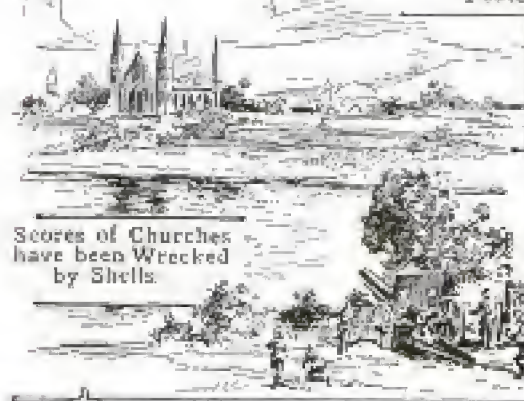


France Provided Many of its Men with Metal Headgear Which Were Worn with Their Kepis Until the New Gray-Blue Helmets could be Supplied. Several of the Soldiers Occupying This Trench are Fitted with These

HOW CHURCHES ARE USED DURING WAR TIME



Making
Periscopes in
British Church
Vestry Used
as Munitions
Factory



Scores of Churches
have been Wrecked
by Shells

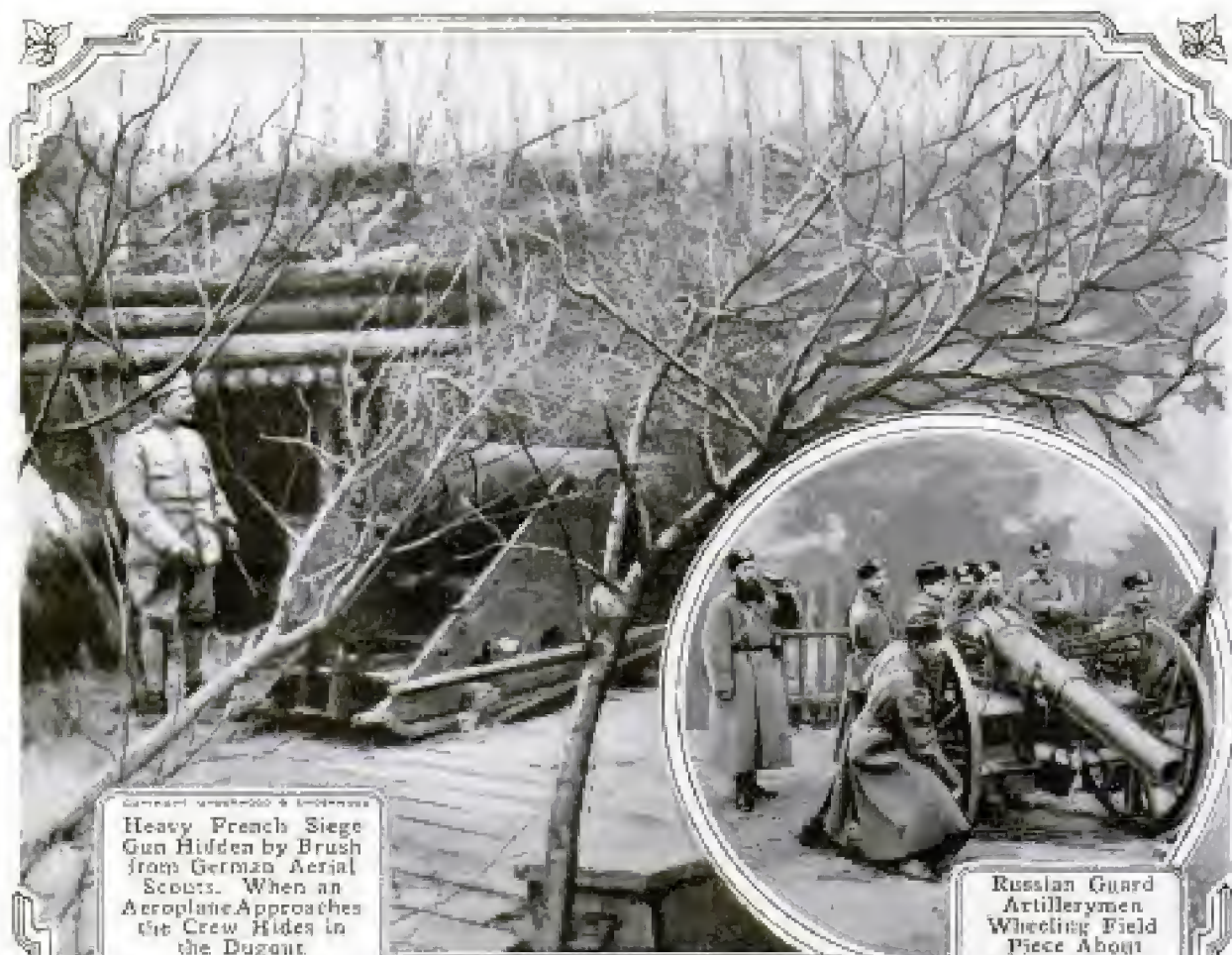


Ruins of Medieval
Church near Warsaw,
First Shelled, Then
Occupied by Germans,
and Later Battered
by Slavs



Germany: Soldiers at Prayer
before Battle:
The Services are
Read from the
Temporary Pulpit
at the Right

CONCEALED ARTILLERY BEHIND ALLIED LINES



BELLIGERENTS EXCHANGE PRISONERS OF WAR



British Soldiers Reaching London after being Exchanged by the Enemy for an Equal Number of German Prisoners Interned by the English



This Dutch Steamer, the "Oranje-Nassau," has been Used in Transferring Men between the British Isles and Holland, Which Country has Served as a Clearing House in the Exchange of War Prisoners



German Troops Homeward Bound from Great Britain, Where They had been Concentrated after being Captured on Continental Fields

HAPPY PHASES OF THE WOUNDED SOLDIER'S LIFE



These French Soldiers, in Charge of Trained Nurses, are Suffering from Serious Wounds, but Smiling. They are Awaiting a Train Starting toward France



Maimed Soldiers in a Berlin Hospital Forgetting Their Wounds While Enjoying an Entertainment Produced in an Assembly Hall



Offering Felicitations to the Bride and Groom, the Former a Canadian Girl Who Crossed the Atlantic to Wed Her Fiancee in a British Hospital

WITH EUROPE'S BLIND AND MAIMED SOLDIERS



Convalescent
Germans Making
a Chessboard
for Diversion



Building Artificial
Limbs for
Maimed Soldiers



This Photograph
was Taken at
Vincennes and
Shows General
Lienard Making
the First Awards of
the New French
War Medal



Blind British Soldiers at a Regent's Park
Home are being Coached as Oarsmen.
Recently They Engaged in a Series of
Remarkable Races

WITH THE WOUNDED AT HOME AND IN THE FIELD



DEPENDENT INTERNATIONAL NEWS SERVICE
Crippled Italian Soldiers being wheeled through the Streets of Rome in Litters Fitted with Shades Which Shield Them from the Sun



Bullet-Proof Housings for Stretchers, Which Look Like Enlarged and Inverted Bath-tubs, Permit the Removal of the Wounded from the Field

Lowering a Wounded Soldier into a Barge for Transportation to a Hospital Base



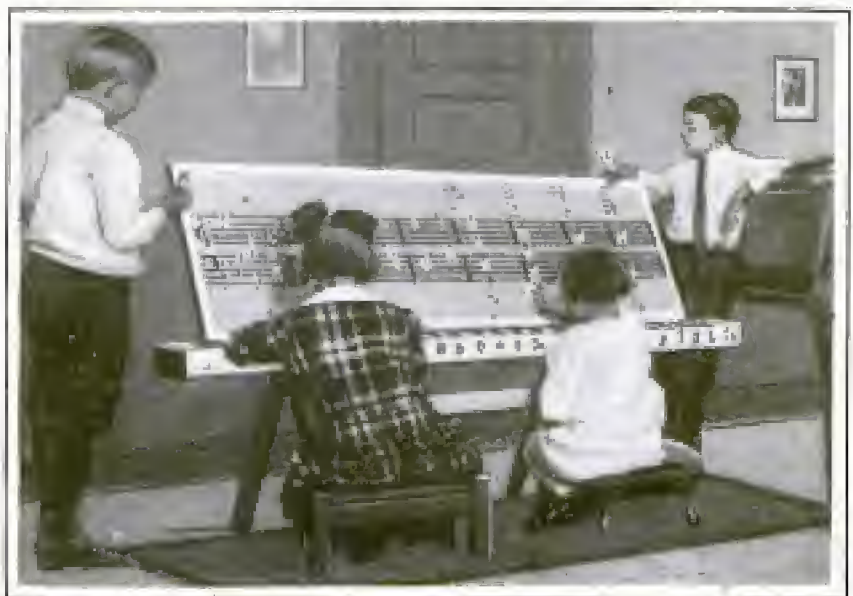
The Ambulance Corps of All Belligerent Armies have Found Dogs Very Valuable for Locating Seriously Wounded Soldiers. This Shows a Group of Animals Used by the Germans

Cont: J. L. Graff
84 W. South Water St.
Chicago. POPULAR MECHANICS

TEACHING CHILDREN MUSIC WHILE AT PLAY

By the invention of a simple apparatus, an Indiana music instructor has devised a means of teaching sight reading to children which makes the study a pastime rather than a dull, irksome exercise much to be avoided. The device consists of a large chart which is lined with parallel grooves in which the various characters, such as semibreve, minim, crotchet, tie, hold, and staccato marks, may be inserted. These characters are marked in black on small, white-enamelled metal pieces which are fitted in the lines. With these a child follows the instructions of its teacher and builds up the staffs in whatever manner directed, placing a clef at the left margin and putting the different marks where they properly belong. Since there is a wide

range of grooves, a staff may be extended in compass above or below as required. Experience has shown that the average child looks upon this exercise more as a means of amusement than an unpleasant task, and is rarely



Making Sight-Reading Exercises a Pastime for Children by Utilizing a Device on Which a Staff may be Built with Enamel Characters

averse to continuing music lessons. It is claimed that the method helps a child to grasp the rudiments of music more readily than ordinary methods.

Cont: Low Strohm, Hall of Records, Los Angeles, Calif. MODEL STREET DESIGNED FOR COURT-ROOM USES

In order to facilitate the work of attorneys and witnesses in street-car claim cases brought before him for trial, a superior-court judge of Los Angeles County, Cal., has installed a horizontal blackboard in his chambers to make it possible for the jurors to be given graphic descriptions of the various phases of different accidents. The board is constructed according to a set scale and made to represent a typical street and intersection. The car tracks are drawn in accordance with conditions presented in any specific case which is being heard.

Miniature street cars and automobiles are provided with it, so that almost any kind of a collision or accident may be illustrated readily. The cars are made of wood in the proper dimensions to represent both those of the surface traction and interurban lines, while a card placed on each model carries information pertaining to the size, weight, and



In This Instance the Board is being Used to Illustrate a Collision between a Traction Car and a Roadster

equipment of the individual car it represents.

Invented by Judge Curtis D. Wallbur,
Superior Court of Los Angeles, Ca.

Winona Lake Assembly, Winona Lake, Indiana

9961

BUILDING THE TOWERS FOR GEODETIC SURVEYS

By HARVEY FERGUSON

Box 3782, Washington, D. C.

A department of the government little known to the layman, but one of wide and adventurous activities, is the Coast and Geodetic Survey. Geodesy may be described as surveying in seven-

the geodesist works in the open country instead of on a piece of paper; he deals with triangles the sides of which may be from 10 to nearly 200 miles in length; and a peculiarity of his work is that the longer he makes the sides of his triangles the more accurate will be the result. The necessity for making observations at great distances presents a difficult problem in engineering, for the geodesist must elevate himself and his instruments to such a height that he can see above all obstructions.

In a mountainous country the problem is simple, as peaks form natural points for observation. The longest observation on record was made between Mt. Helena and Mt. Shasta, in California, a distance of about 190 miles. In level country the geodesist must devise means for lifting himself to a height of from 60 to 150 ft. above the ground, and at this elevation he must have a platform steady enough to make delicate observations possible. This necessity has led to the development of some novel structures by the geodesists who are carrying the primary triangulation system into wild country. In the dense spruce forests of the Olympic Peninsula, for example, a tower strong enough to withstand the heavy winds and giving an elevation of 145 ft. for the instrument was made by bending and binding together three spruce trees that towered above their neighbors. The close-growing branches made a natural ladder by which the observer reached his lofty platform. By using powerful acetylene lamps at night and heliotropes, or sun-flashing mirrors, during the day, signals were sent and received over distances of from 10 to 40 miles. Another tower was built in a spruce forest simply by cross-bracing three trees, each of which was about a yard in diameter at the base and about 18 inches at the level of the platform, which was 150 ft. above the ground.

On the Canadian boundary survey it was found necessary to build towers, as the trees growing along the line were



This 145-Foot Tower was Built by Binding Together Three Tall Spruce Trees

The Top of This Lone Tree Supported a Platform on Which the Geodesists' Instruments were Mounted While Carrying a Survey through a Forest

league boots. It consists in covering the country with great lines of primary triangulation which serve as the foundation for practically all the surveys made by this department. Triangulation is based on the well-known principle by which, with one side and two of the angles of a triangle known, the other two sides can be calculated. But

Mfr.
Beck Engineering & Mfg. Co.,
230 Mill St.,
Rochester, N. Y.

NEW AUTOMOBILE LAMP HAS

INDIVIDUAL BATTERY 9555

not large enough to be used as they stood. A serviceable tower, 75 ft. high, was built from poles cut in the vicinity. In this, as in all towers built without the use of standing trees, there is an inner tripod that supports the instrument and an outer four-sided tower that holds the platform on which the observer stands. This insures the necessary stability for the instrument. These towers are strongly built, with their bases deeply anchored in the ground, and many of them have withstood windstorms that were little short of hurricanes.

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BATTLESHIP FLEET PASSES THROUGH PANAMA CANAL

The first battleships to use the Panama Canal were the "Missouri," "Ohio," and "Wisconsin," of the United States Navy, which passed through the canal on their way to San Francisco July 16, 1915. This battleship fleet, of which the "Missouri" was the flagship, was engaged in the service of transporting the cadets from the Naval Academy at Annapolis, Md., to the Panama-Pacific Exposition. The entire canal, including the section affected by the Cucaracha slide, was traversed without difficulty.

International News Service.
238 William St.,
N. Y. C.

An electric lamp that is supplied with current by its own individual battery is one of the latest features in automobile equipment. This lamp is carried on a bracket similar to that used with an oil lamp, and no wiring is necessary. The battery used is the No. 6 dry cell commonly used for general automobile purposes. Used intermittently, the lamp will burn from 50 to 100 hours, according to the condition of the battery, while the battery is easily and quickly replaced when exhausted. The light is turned on and off by a button conveniently placed on the side of the lamp.

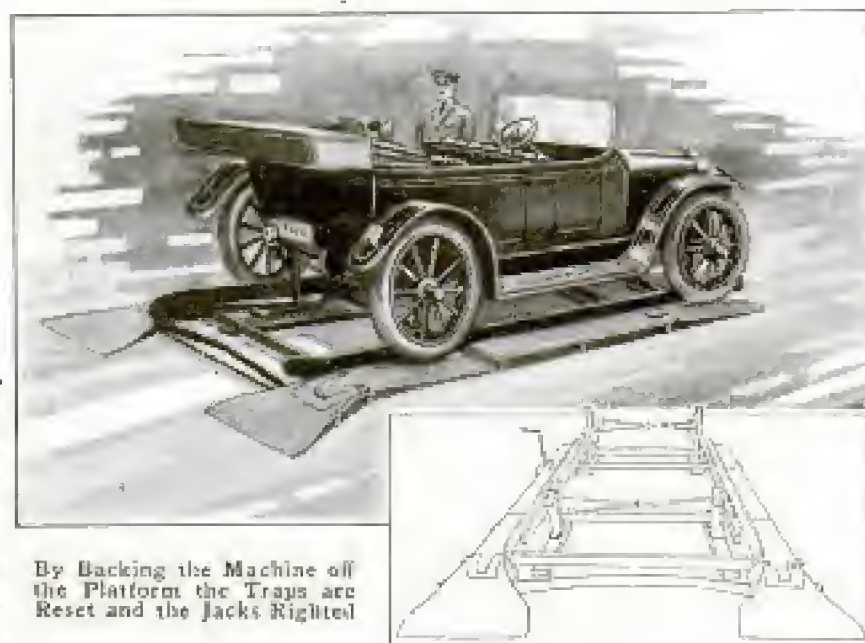


The "Missouri" in the West Chamber of the Locks at Pedro Miguel. This Battleship, accompanied by the "Ohio" and "Wisconsin," was the first to pass through the Panama Canal.



SELF-OPERATING JACK MADE FOR MOTOR-CAR PURPOSES

For use in a motor-car garage, a self-operating jack is being made which is particularly convenient for the owner



By Backing the Machine off the Platform the Traps are Reset and the Jacks Righted

who does his own repair work. The device is built with a metal framework, on two sides of which are board tracks fitted with spring traps. Rubber-cushioned arms support the front and rear axles of a machine. At the proper instant, when a car is driven upon the apparatus, the four traps in the guide boards are sprung, allowing the wheels to drop slightly and the machine to push onto the tilted supports. This operation is done without requiring any work on the part of the chauffeur other than that of driving the car. To remove a machine from the jack, pressure is first applied to a foot pedal which lowers the supports so that the car rests on its wheels and is able to back off the platform. The traps are reset and the jacks righted automatically.

¶The best quality of rice available in United States markets is grown in Arkansas, it is said. Although this industry is not an old one in that state, last year 96,318 acres were given over to it.

FREE MEDICAL TREATMENT FOR IOWA CHILDREN

In accordance with a law now in effect in Iowa, children under the age of 16 years, who are suffering from some

curable malady or deformity, upon the order of a district-court judge may be given free medical and surgical treatment as well as hospital care at the medical college of the state university. The statute prohibits that any child thus cared for, however, be made an object of experimentation. This service is extended only to those whose parents are financially unable to bear the expense of having treatment rendered in the usual way.

If the court so dictates, a child may be accompanied to the university by a parent or appointed companion with all expenses paid by the commonwealth. Under the terms of the law it is illegal to treat any ailment other than is specifically prescribed by the judge, who bases his instructions upon a written report presented by an examining physician under his direction.

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LUMBER SHIPMENT TRAVELS TEN THOUSAND MILES

Although the distance between the two points "as the crow flies" is only 1,400 miles, a cargo of Douglas fir that has been shipped from British Columbia to Port Nelson on Hudson Bay, where it will be used in the construction of docks, will be required to make a journey of nearly 10,000 miles to reach its destination. The shipment is to be taken all the way by water, the route lying through the Panama Canal, up the Atlantic coast and into Hudson Bay through Hudson Strait.

American Automobile Jack Co.,
Hicksville, Ohio.

"Journal of American Medical Assoc." 6/7/15
"Daily Consular Trade Reports"

Cont: Horace M. Engle.

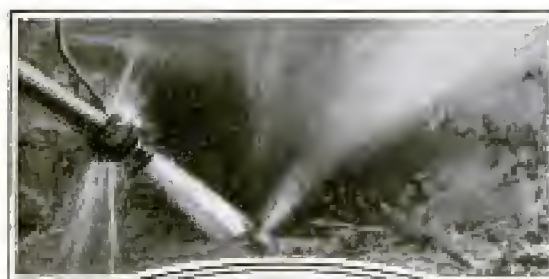
Box 157, Marietta, Pa.

9/21

POPULAR MECHANICS

531

HEAVY EXCAVATION WITH THE HYDRAULIC GIANT



Using Hydraulic Giant for Stripping the Earth from Mineral Deposits at a Mine in Canada: This Machine Throws a Five-Inch Jet under a Pressure of 200 Pounds to the Square Inch

Washing the dirt and boulders out of the way with a jet of water thrown at high velocity from a hydraulic giant is now recognized as one of the most efficient methods for stripping the earth from mineral deposits as well as for many other kinds of heavy excavation. The hydraulic giant consists simply of a tapering metal tube, or nozzle, usually from six to eight feet long, to which water is supplied under heavy pressure. It is so mounted that it can be swung both horizontally and vertically, a feature that makes it possible to direct the jet at any point in a big area. The work done by the hydraulic giant

depends on the impact of the water, and for this reason the force exerted is a factor both of the size of the jet and the pressure under which the water is supplied. When a jet of water is thrown at high velocity from one of these machines it has many of the qualities of a hard, rigid bar. In tests made to determine the hardness of jets produced by heavy pressure, attempts to cut through the jet with a sword have simply resulted in the break-

ing of the blade. In actual practice the head may vary from a hundred feet to several thousand feet, or the equivalent pressure may be supplied by means of pumps. The hydraulic giant used at the Nipissing mine in the Cobalt field in Ontario, Canada, shown in the illustrations, throws a 5-in. stream. It works under a pressure of 200 lb. to the square inch, equivalent to a head of 460 ft., the water being supplied by two centrifugal pumps.

Approximately 250,000,000 incandescent lamps were manufactured in this country during 1914.

* See *Hendricks Register* / *Giant (Hydraulic)*
See *T. K. ...*

DISH WIPING UNNECESSARY WITH CHINA RACK

For household use, a dish-drying rack is being introduced which is intended to eliminate entirely the ordinary pro-



This China Rack is Intended to Make Dish Wiping an Unnecessary Procedure

cedure of wiping china after it has been washed and thoroughly rinsed. The drier is made of white-enameled wood and is designed to be fixed to the wall immediately above the draining board of a kitchen sink. It provides an individual space for each piece of china so that the danger of breakage is materially lessened. As the dishes are washed and sterilized with hot water, which frees them from traces of soap, they are placed in the rack and allowed to dry of their own accord. After about ten minutes, providing the rinsing has been done properly, the china will be found clean and free from lint, which is frequently present when dishes are wiped.

No employe in the buffet service of one eastern railway company had a contagious disease when recently examined.

FARMERS ARE BENEFITED BY FOREST SERVICE

One of the principal reasons that agricultural development has been slow in remote regions adjacent to some of the Federal forest reserves has been the lack of good roads. Many of the farmers in these localities are settlers doing pioneering work under as difficult conditions as have ever been encountered in this country. Because of this situation, the government is attempting to lend its assistance in the work of upbuilding these districts so as to open up large areas of land for cultivation. Some of the individual forest reservations are giving a revenue of as much as \$100,000 annually, and one-fourth of the receipts are contributed to the counties in which the timbered areas exist, for the construction of roads and the establishment and maintenance of schools. In some cases, however, the forests are not yet earning. Because of this, a plan is being advocated which contemplates asking Congress for an advance of money in anticipation of the forests' future receipts. In addition to its other work the Forest Service has built, up to the present, 2,300 miles of roads in the reservations, 21,000 miles of trails, nearly 600 bridges, and 18,000 miles of telephone lines.

GERMANS USING PEAT AS AN INSULATING MATERIAL

Compressed and formed into sheets, peat is now being extensively used in Germany as an insulating material in place of cork, which has become practically unobtainable as a result of the war. The sheets are made in varying thicknesses and are used in the same way as cork sheets. As an insulation against heat and cold the peat has about the same efficiency as cork. As a sound-proofing material it is said to be far superior to any other substance, tests having shown that its efficiency for this purpose is about seven times that of cork.

"Technische Monatshefte
Exchange"

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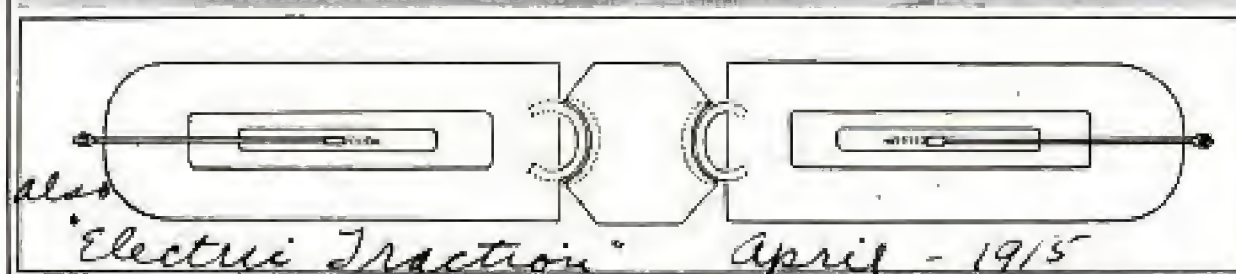
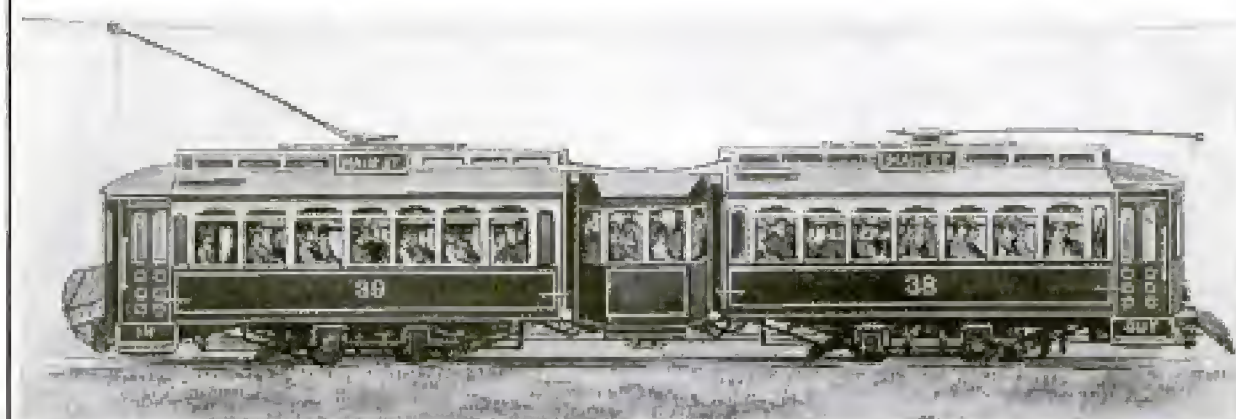
Sanitary Dish Drier Company,
P.O. Box 576 - Chicago, Ill.
Kam. Co. Mo.
239 B. Bigelow Ave. St. Louis,
Mo.

Information Sheet.
Forest Service.

Car operated by Virginia Railway + Power Co.,
Richmond, Va.

POPULAR MECHANICS 533

Chas. C. Johnson, Asst. to General Mgr. of above Co.
supplied information.



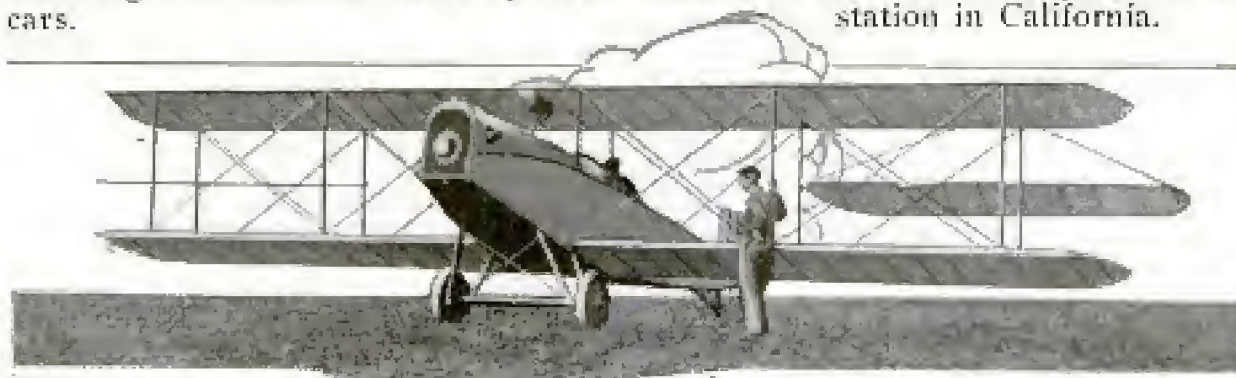
The General Appearance of the Hyphenated Car is Shown by the Cut, While the Diagram Below Indicates the Manner in Which the Intermediate Compartment is Mounted in Order to Allow the Negotiation of Curves.

ARTICULATED CAR OPERATED
4.5 IN VIRGINIA CITY

To avoid the necessity of discarding a number of single-truck carriers, a surface-traction company at Richmond, Va., has adopted a plan of joining two cars by building a small compartment between them after removing the adjacent platforms. Virtually the result is a hyphenated vehicle, somewhat odd in appearance but nevertheless serviceable and considerably better on rough track than single-truck equipment. A means has been worked out for preventing the oscillation of the center compartment, the weight of which is borne by both cars.

THREE-SEAT TRACTOR PLANE BUILT FOR SCHOOL USE

Pleasing lines are incorporated in a new tractor biplane which has been built for an aviation school at North Island, San Diego, Cal. It mounts a 60-hp. motor which is capable of giving the craft a speed of 65 miles an hour when it is carrying three persons, and sufficient fuel to last two hours. It may be throttled down to 30 miles an hour with safety. With a full load it is able to climb at a rate of 400 ft. a minute. The machine is quite similar to one type of craft which has recently been delivered at the army aeronautic station in California.



New Tractor Designed and Built for a California Flying School

45- Cont: 8. Edward Barnhart,
Hotel Elvira, San Diego, Calif.

NEW FENDER FOR MOTOR CAR IS NEAT IN APPEARANCE

One of the chief difficulties which has stood in the way of developing a



Canvas
Fender
for Autos

practical fender for motor cars, the question of lightness, has apparently been overcome by the invention of a combination bumper and pick-up basket. When the device is in normal position, the connecting rods clamped to the springs and abutting against the front axle, its appearance is quite like that of an ordinary bumper, for which it serves. By pressing a button fixed to the steering wheel of a car, however, one set of the arms instantly drops, the bar parts and a large canvas pocket, which extends from within 2 in. of the ground to the top of the mudguards, is shot out in front of the machine. This is said to be capable of picking up a pedestrian and carrying him safely until the car can be brought to a stop. Its operation is controlled just as easily as is that of a siren. The device is said to have shown merit in tests.

HIGH-POWER WIRELESS AT SAN FRANCISCO FAIR

One of the most interesting features of the government's wireless exhibit at the Panama-Pacific Exposition is a sound-magnifying receiver through which the time signals from the Mare Island Naval Observatory, on San Pablo Bay, are rendered sufficiently audible to permit visitors to set their watches by them at a distance of 30 ft. from the apparatus. It is also reported that signals have recently been received from the Eilvese station in Germany.

Radio Service
Bulletin

FLEXIBLE AIR DUCTS FOR TUNNEL CONSTRUCTION

A decided innovation in tunnel ventilation has been introduced in the sewer work now in progress in St. Louis, where flexible air ducts made of rubberized fabric are being employed in place of the usual galvanized-iron, or other metallic, ducts. The principal advantage in the use of this kind of tubing is that it is easily installed as the work progresses, and can be rolled up and taken out of the way when a blast is to be fired and then re-extended quickly. It is made in 100-ft. lengths, which are equipped with special couplings. A 24-in. tube carries the air down the shaft and from this point 16-in. tubes lead to the headings, each about 1,600 ft. distant from the shaft. The rubberized fabric is both air-tight and water-tight, and the makers believe that the tubing can be used to advantage as a temporary water conduit in many instances.

MOTORCYCLE ENGINE VALVES LIFTED BY SIMPLE TOOL

Fashioned somewhat after the form of a pair of heavy tweezers, a convenient instrument



has been introduced for the use of motorcyclists in removing engine valves. It does away with the trouble commonly encountered when it becomes necessary to lift a valve from the heated chamber of a motor, an operation

which frequently results in burned finger tips. The knurled ends of the tool spread apart when the bowed spring is pressed together. So, in using it, the instrument is inserted into the slot in the valve head, pressed with the fingers, and then withdrawn, bringing the movable parts of the valve with it.

COMMENT AND REVIEW

AT this writing the sorrow of the "Eastland" disaster is rapidly fading into history, while the usual investigations by various city, county, and Federal officials are progressing. Various causes will be set forth as more or less contributory, but the simple verdict of "overloading" will include all the others. Owners and managers, by reason of immunity from accident in the past, naturally grow impatient at restrictions imposed, and use every means to load to maximum capacity. A maximum load on either a man or machine is just a little more than prudence will suggest, as it removes that margin, though small, which furnishes the factor of safety.

*"Safety
First"
"Eastland"
Memorial*

The other Chicago calamity, the fire in the Iroquois theater a few years ago, also claimed chiefly as its victims women and children. That disaster so awakened the sluggish public that today scarcely a theater throughout the entire United States but has been made either safe or far less dangerous as a result.

The most imaginative novelist could scarcely have had the temerity to weave in fiction what actually took place in the case of the "Eastland," so unusual were the conditions and so startling the effect. Monuments in stone and a memorial of some benevolent character will commemorate the event, but the best memorial would be that which will make a repetition impossible, and safeguard the public for all time to come.



THE employment of so many plants on munitions of war and the incident training of thousands of men to the work is an asset to this country of very great importance. For while other nations, even smaller than our own, have encouraged and fostered such plants, we have drifted along in dreamy indifference to what the balance of the world were doing. That the day is at hand in which we must awake and strengthen our arms both at sea and on land, is already generally realized. The voice of the jingo is hushed and that of the pacifist—well-meaning but easy-going

*Preparedness
a Duty*

—is stilled in the presence of a responsibility more vast than any which has confronted this nation since old Liberty Bell rang out the glad news.

Our state of unpreparedness is absolutely pitiful, and can be mentioned with perfect frankness, for while the mass of our own people know little and appreciate less our lack in every essential, the war archives of every foreign country are bulging with records of what we have not. The submarine of 1915 and the 42-centimeter gun give us something very definite with which to compare ourselves, and the comparison is appalling. An effective standing army between the Atlantic and Pacific of barely double the police force of New York City, to guard 5,000 miles of seacoast and the richest country in the world, does not suggest that sagacity and forethought on which we

have prided ourselves. Both our navy and army, what we have of each, are excellent; we are justly proud of them, but a single fire engine cannot put out a big conflagration.

America, the birthplace of the aeroplane and submarine, still uses the one chiefly as a circus entertainment, and of the other has a mere handful, and those of short cruising radius and doubtful reliability.

A kind Providence has spared us thus far, but we must not tempt fate a moment longer, and in the provision of an adequate defense—for we have no desire or occasion to aggress—the most remote farmer a hundred miles from the nearest railroad is equally interested with the city dweller on an exposed coast.

Congress does not always appropriate the funds at command in a way the most commendable, nevertheless the President and the next Congress should have the unanimous support of the entire country, as we awake from our Rip Van Winkle sleep and come down to the real problems and responsibilities which have been gathering with the advent of the twentieth century.



IF an enemy had succeeded in driving the American Flag from the high seas only a fraction as effectively as our lawmakers have legally done, the whole nation would be aroused and in arms. Apparently no effort has been neglected to make the burden of flying the American Flag as heavy as possible.

*Scuttling
American
Ships*

As a result the Pacific Mail S. S. Co. will very soon withdraw its ships from the trans-Pacific trade; and when the Great Northern does the same, as its vessels are unprofitable, there will remain no American trans-Pacific line, and this vast oceanway will be left to Japan to claim and use. That Japan will not be slow to seize the opportunity goes without saying, for Japan subsidizes the ships that fly her flag, while the United States refuses a dollar of encouragement and imposes restrictions and requirements which are in effect a practical prohibition.

Even the Great Lakes are not immune; for when the idiotic La Follette act takes effect next November, the American Flag will come down from a forest of mastheads, not to fly again until the law is changed. Labor unions are credited with the conception of the La Follette bill, which was heralded as an act "to promote the welfare of American seamen," but which in its results will promote thousands of sailors out of a job. The Interstate Commerce Commission has also lent a helping hand, and the lake steamers of railroad lines will have to tie up. Inasmuch as these lines have not been particularly profitable under fairly good conditions in the past, it is not to be expected navigation companies will spring up and clamor to buy these ships. With the close of navigation on the Great Lakes next December, the American Flag will be practically exterminated on the inland seas. The boats will almost certainly be sold to other countries.

What a fine thing it all is; what a grand accomplishment; how proud we all should be to have made it almost a misdemeanor to fly

our own flag, and to have thrown so many obstacles against its being flown from the masthead that an owner and captain stand a mighty good chance of going to jail every time they do it! While almost every other nation which has even a few miles of seacoast is striving in every way to encourage its marine, we, with the largest available seacoast on earth, have apparently neglected nothing to exterminate the little marine we had. This country will pay a costly penalty one of these days, and will reap in humiliation and dismay the bitter harvest which shortsighted and misguided politicians have sown for us.



BUSINESS conditions are certainly beginning to show improvement, although the taking up of long-unused tools is gradual. Many lines of manufacture are yet either idle or working at low ebb,

*Better
Times
Here*

while those capable of turning out any sort of war supplies are running at high speed. Millions of dollars even are being spent for new plants in which to fill war orders. In this connection it is interesting to watch the movement of the so-called war stocks, prices of which have gone soaring. The man of moderate means, however, will do well to let these stocks alone

and confine himself to the purchase of any one of scores of reliable securities which, while they do not promise a king's ransom in a minute, have a worthy record for good management and fair returns, and can be bought at prices lower than in years. The war stocks are a rich man's game, which may return extraordinary profits for several years, but are more likely to disappoint the inexperienced.

Prosperity is certainly peeping through the clouds, and there is every evidence that better times are rapidly approaching. Billions of dollars in harvests and billions more in war orders are pouring gold into Columbia's lap as never in our history. Already the steel industry—that reliable business barometer—is pointing toward "good," and the railroads, that other large and sympathetic factor, are reporting increasing earnings and are beginning to buy supplies. The main thing to keep in mind is a reasonable degree of prudence in permanent investment as production becomes taxed to its limit with the temptation to overbuild.



DURING the past year Europe has purchased from us a billion dollars' worth of supplies, chiefly foodstuffs and munitions of war. We in turn have absorbed many millions of our own bonds

*U. S. Dollar
Becomes
World's
Standard*

and stocks which have been sent here for sale. Patriotism and the opportunity to purchase bonds of their own government at favorable prices have caused foreign capitalists to give up our securities, many of which had been held abroad for 20 years. That prices of our securities have been so well maintained is, of course, highly gratifying. There will

doubtless be millions more to follow in the next twelve months.

On the other hand, the United States Dollar is now the standard measure of value throughout the world, and the only unit which is not below par. When business transactions in South America are discussed in terms of dollars instead of pounds or marks, a great advance has been made toward the day when the financial center of the world shall be in the United States; but when that day arrives, its sun will flash the light of freedom from our flag on every sea and in a hundred ports, with a navy which will assure to every American that same courteous respect which is afforded every Englishman.



AT last it is beginning to dawn upon us that the man whose carelessness and stinginess permits his building to catch fire and burn, incidentally causing loss to any number of innocent bystanders, is a pest and should be treated as such. As has been urged in these pages more than once, we should copy the long-established practice in Great Britain and on the Continent, and impose a penalty on the man whose building has a fire, instead of rewarding him with fat fire-insurance policies, which put an actual premium on the largest possible loss and damage by fire and

*Fire
Department
for Hire*

water. On the other side, when the fire department is called, the man with a fire pays a good round sum for the services of the firemen and equipment. Instead of a thrill at being the basic cause of a brilliant setting for a moving picture, with brightly painted ladder trucks and resplendent steamers, and a few score of the bravest, in motor trucks, dashing to the rescue, there is consternation at the prospective bill, for the more that come the bigger the charge will be.

Where a good part of the prospective insurance money is consumed in advance by the bill the fire department will collect for their professional visit, a fire loses much of its charm. A city levies charges for the water it supplies for domestic purposes, and why not for water pumped to put out fires? The fact is, a score of things are charged for by cities which are not a fraction as logical as to charge for the use of the fire department.

New York and Boston have already announced their tariff charges for fire service of one steamer up, and other cities should promptly do the same. A very large percentage of fires would never have occurred if some one had used reasonable care, and nothing will stimulate greater care so much as having to pay for what is now free as air.

H. H. WINDSOR

August 10, 1915

Cont.- Geo. A. Obenauer, 921 Smith St., Buffalo.

Foundation of POPULAR MECHANICS

539

Buffalo's new Lehigh Valley Dep. Station



Concrete Piles with Jetting Pipes Incorporated within Them and Reinforcing Skeleton Used in Their Construction

213

PIPES IN CONCRETE PILES FACILITATE JETTING

Reinforced-concrete piling is being employed to provide a base for the foundation of a large railway station to be erected near the water front, at Buffalo, N. Y. The general form of these monoliths is similar to that of those ordinarily used for such purposes. An interesting feature in their construction, however, is the provision which has been made for jetting them into place. In molding each pile a long section of pipe, having an elbow at one end, was incorporated. This extends longitudinally through the middle of the pillar, one end opening flush with the bottom and the other coming out at right angles about three feet from the top. In sinking one of these piles a connection is made with the upper end of the pipe and the water is pumped through under heavy pressure. The force of this digs a hole for the monolith, which settles gradually into

place. The work is more easily done and better results are attained this way than by jetting with an auxiliary pipe at one side of a pile.

308

ELECTRIC TIDE INDICATOR FOR NIGHT OBSERVATION

— *Electrical World*
June 4/15

For the purpose of registering the state of the tide at night in connection with dredging operations, a British firm is making use of an interesting electrical gauge. A timber dolphin, placed about a half mile from shore, carries the apparatus, which partly consists of a compact, automatic electric-light plant that supplies current to five lamps of different colors. A float, fixed in a standpipe under the dolphin, controls a number of switches. The rise and fall of the tide operates these, causing different lamps to be illuminated according to a prescribed code. The level from naught to 19.5 ft. is indicated by the colored-light combinations.

Mfr: *Gent & Co., Ltd.*

Faraday Works,

Leicester, England

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AUTOMATIC DANGER SIGNAL AT STREET-CAR CROSSING

In order to warn motorists and others of the approach of traction cars

at an intersection of two narrow streets where the view is obstructed by buildings, fences, and trees, an electric signal of rather novel appearance has been put in use. At the top of an iron post, which also carries the street signs, is mounted a propeller-shaped member which oscillates whenever a car nears the crossing. At night a sign beneath this signal arm bearing the word "Danger" is illuminated in red.

It is estimated that the average life of a British officer after he

reaches the firing line is only 23 days. A cavalry horse lasts about ten days and an automobile a month.



CAPE COD CANAL A BUSY WATERWAY

An idea of the value of the Cape Cod Canal to shipping is given in the fact that more than 2,500 vessels have passed through this waterway since it was opened in the summer of 1914, each of these vessels saving something like 70 miles of travel and avoiding the dangerous route around Cape Cod. One of the largest of these vessels was the "Tenbergen," a Dutch steamer of 3,826 tons. Many government vessels have passed through the canal, among these being the submarines "K-5" and "K-6," which made the trip from Boston to Newport at an average rate of 11 miles an hour. Only 45 minutes was required by the two submarines in making the passage through the canal.

WAR PRISONERS ARE HELD IN CANADIAN FORTRESS

Fort Henry, an obsolete Canadian fortification adjacent to Kingston, Ont., is being used as a place of internment for some 200 German and Austrian prisoners. Hundreds of aliens within the confines of the Dominion have comparative freedom, but those who either have refused to agree to the terms of parole, or are looked upon as dangerous persons to be at large during war time, are kept under guard. The men held at Fort Henry entertain themselves by playing football and baseball on a compound surrounded by the inner walls of the structure.



Approximately 200 Germans and Austrians are Held Prisoners in This Old Fortification near Kingston, Ontario

Cord: George Paterson,
22 Lincoln Street,
Detroit, Mich.

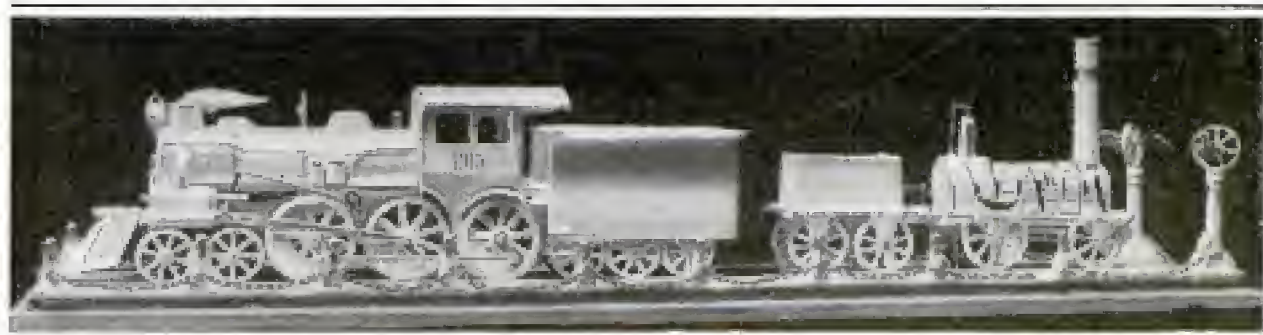
8/7/15

Army & Navy Journal

Robert Aslack,

Ottawa, Canada.

33 Broadway Ave.



Old and New Types of Railway Locomotives Molded in Sugar by Hand

One nationality plays against the other and much rivalry is displayed. The fortification was built in 1836 and is typical of those guarding the boundary. Although it mounts a number of guns, it is considered, like many of the others, absolutely worthless for defense purposes.

PLAN FOR LESSENING COST OF STREET PAVEMENTS

Interesting results have marked recent efforts, made at the University of Oklahoma, to devise a means of effecting a saving in the expense of constructing street pavements. It has been found that the cost of laying a concrete base can be cut approximately 50 cents a square yard by making a thinner spread than is customary and strengthening it with a light reinforcement. Laboratory tests of a severe character have shown that a 3-in. concrete slab reinforced with rectangular-mesh hog fencing, which can be procured for from three to five cents a square yard, is almost equal in strength to a 6-in. unreinforced slab of like linear dimensions. Approximately, concrete costs from 15 to 20 cents a square yard for each inch of thickness. Thus the saving which may be derived, by lessening the thickness by half and adding five cents worth of hog fencing to each square yard, is apparent. According to the director of the university's engineering school, the plan, if followed, would not merely give results as satisfactory as those obtained by the usual form of construction, but undoubtedly greatly better ones would be secured.

MINIATURE RAILWAY ENGINES

326 DESIGNED IN SUGAR

Small replicas of a modern express locomotive and a diminutive, antiquated, wood-burning engine of pioneer railroad days, have been made of sugar by the chef of an Atlantic City hostelry. All of the molding was done by hand with remarkable artfulness, considering the character of the material used. The miniature models, which have been set end to end and placed on display, measure approximately eight feet in length.

8898 CONVENIENCE IS EMBODIED IN NEW THEATER CHAIR

One of the most annoying features of the usual seating arrangement in



With Slight Exertion the Seat may be Moved Back so as to Provide Plenty of Space for a Person to Pass without Crowding

theaters has been at least partly overcome by the invention of a new type of chair. This enables a person to pass in

The Auditorium Chair, Co.
861 Empire Bldg.
Seattle, Wash.

Sold: Harper & Smith, 173 S. Kentucky Ave., Atlantic City, N.J.

Consent: Handel, Fowler & Co., Seattle, Wash.

Engineering Record, 6/5/13

Copyrighted material

front of the occupants of aisle seats, when going to or from an inside chair, without particularly disturbing them. At the same time the seats are placed as closely together as is customary. It is mounted in a fixed support in such a way that it may be moved back several inches by moderately pushing with

the feet against the floor. This may be done almost without exertion, just as a rocking chair may be tilted back naturally. The result is that a passage way is quickly provided and the necessity of a long row of persons rising in order to allow others to crowd past them, is eliminated.

305

SKULL IS CASE FOR CLOCK GIVEN GERMAN PRINCE

Although its appearance is not such as could be called pleasing, a clock of both curious and significant design
"Mesa Revuelta"



Skull Clock of the Prussian Crown Prince, Colonel of the "Death Hussars"

has been patterned for the crown prince of Prussia. The case consists of a human skull mounted on cross-

bones. The hours and minutes are shown by large numerals displayed in the eye sockets. It was a recent gift to the prince by his consort. The appropriateness of the design is apparent when it is remembered that the prince is colonel of the "Death Hussars."

SIGHTLY BAND PARK BUILT IN CALIFORNIA CITY 153

At Redlands, Cal., an open-air concert park has been laid out in an attractive manner. It is built much in the form of a large bowl, beautified by palm trees and encircled by a broad cement walk at the street level. The floor, which is covered with gravel, slopes gradually toward the middle, where a cement bandstand has been constructed. The seats are typical of those which are coming into general use in parks and public places along the coast. They are especially sightly and made with concrete center and end pieces which support heavy planks. A narrow grass terrace surrounding the park is cut at intervals by broad cement steps leading to the aisles.



The Ground was Excavated to Allow the Floor to Slope Gradually from the Street Level to the Middle of the Park, Where the Band Stand has been Erected

This Shows the Great Concrete
Structure as It was Nearing
Completion

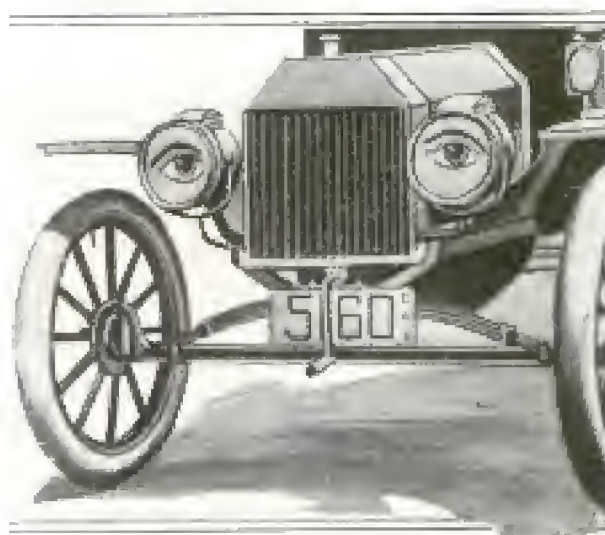


ELEVATOR UNLOADS GRAIN IN RAPID MANNER

26 On the river front at Buffalo, N. Y., a concrete grain elevator with a 1,050,000-bu. capacity has been erected which has unusually good facilities for loading and unloading both cars and steamers. When work is in full swing, it is possible to unload the largest grain boat sailing the Great Lakes in approximately 10 hours' time. The capacity of the unloading cars is about 40,000 bushels an hour. It is also said to be possible at this elevator to load a like quantity of grain into freight cars and about 20,000 bushels into ships and canal boats, an hour. The dock is 811 ft. in length, which provides adequate space for berthing two large boats, or possibly three small ones. Trackage is also provided in adjacent yards for approximately 1,400 cars. Although the capacity of this elevator is not exceptional, its loading facilities exceed those of many lake plants.

2/2 HUMANLIKE EYES ARE FIXED IN MOTOR-CAR HEADLIGHTS

For advertising purposes a Los Angeles company has installed a pair of electric eyes in the headlights of one of its motor cars. These are made to



Eyes in the Headlights are Opened and Closed
Electrically

Weaver Roof Co.,
Los Angeles, Calif.

A. S. Burtis, 339 E. 2nd St.,
Los Angeles, Calif.



Dingy County Jail in Rock-Walled Mountain at Arizona Town

*H. E. Zimmerman,
Mt. Morris, Ill.*

represent human eyes and completely cover the glass panes shielding the reflectors. By means of a push button fixed to the steering wheel, the driver of the machine is able to cause them to open and close slowly. The novelty has attracted considerable attention.

"The Engineer" 8/6/15
WHAT THE WAR IS COSTING

437 **MERCHANT SHIPPING**

During the first eleven months of the war approximately two per cent of the world's shipping, estimated on the basis of tonnage, was wiped out. When the war broke out the world's merchant tonnage of all classes was about 48,000,000 gross tons, of which 20,431,534 tons was British and 5,082,061 tons German. Without taking into account the ships held or captured by an enemy, 511 ships aggregating 915,457 tons were eliminated prior to July 1, 1915. During this period the British alone lost 327 vessels having an aggregate tonnage of 609,934 tons.

ARIZONA PRISON IS BUILT IN MOUNTAIN SIDE 9944

What is undoubtedly as forbidding-looking a prison as is supported by any community, and one which also is more or less curious, is that maintained by Graham County in Arizona, at Clifton, the seat. It is properly a cave, partly artificial, which extends through rock formations parallel with the outside of the mountain in which it is situated. It is divided into compartments which are supplied with bar-covered holes blasted through the rock wall to admit light and air. The entrance of the underground prison is closed by a small masonry structure which is occupied by the sheriff and his staff, and separated from the cell rooms by steel gates. The jail windows are so high above the floor that escape from the place, without assistance from the outside, is made next to impossible. One might pass the prison many times without becoming aware of its existence.

FLOATING MASONRY CHIMNEY SWAYS IN STRONG WINDS

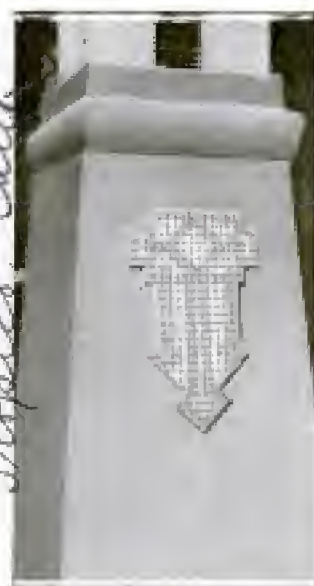
After 34 years of service a floating masonry chimney, 304 ft. in height, which rises beside a factory building at Frankfort Junction, Pa., and sways freely during heavy winds, is still in a good state of preservation. At the time of its erection the engineer having the work in charge discovered that a vein of quicksand extended beneath the point where the foundation for the stack was to be laid. He met the difficulty by casting a solid block of concrete, 30 ft. square and 5 ft. thick, and employing it as a floating bed for the heavy masonry. Curiously, when the stack swings in the wind it always moves slowly in a north and south direction. It has not suffered a serious departure from the vertical.

Schlichter Gute Cordage Co.
Frankfort Junction, Pa.

42

TILE ORNAMENTS APPLIED TO CONCRETE PILLARS

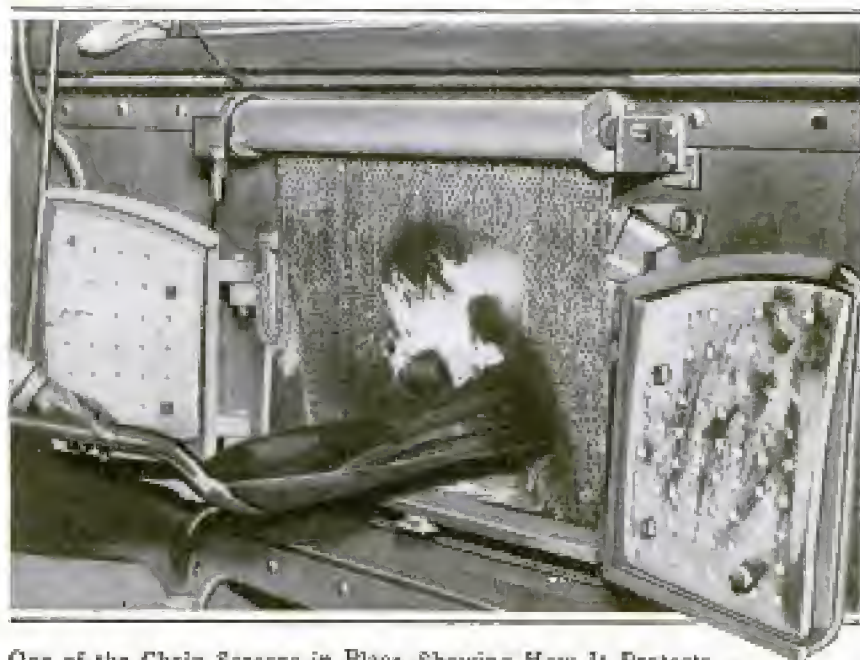
Tile ornaments applied to the faces of concrete pillars are the latest feature in building decoration in southern California. Each ornament is made up of small tile of various colors assembled to form an attractive design, and is usually about 12 inches wide and 18 inches high. The ornament is applied after the pillar is completed by means of liquid cement.



Walter Marple,
322 Boynton St.,
Troy, Calif.

FURNACE DOORWAY SCREEN MADE OF CHAINS

To prevent an excessive volume of cold air from entering a furnace and cooling its brickwork and crown sheet-



One of the Chain Screens in Place, Showing How It Protects a Furnace Opening While Not Obstructing the View of the Fireman

ing when the fire is being stoked, or the door opened for other purposes, a chain screen has been invented which covers the aperture. It is made of steel chains of uniform lengths attached to a cylinder that is secured on brackets fixed across the top of the furnace opening. When the device is to be used the drum is unwound like a curtain roller, allowing the chains to fall evenly across the doorway, screening it and checking the entrance of too much cold air and the escape of heat. Aside from its economical feature, the chain door protects the fireman by shielding him from intense temperatures. It is intended to be used with practically all kinds of furnaces.

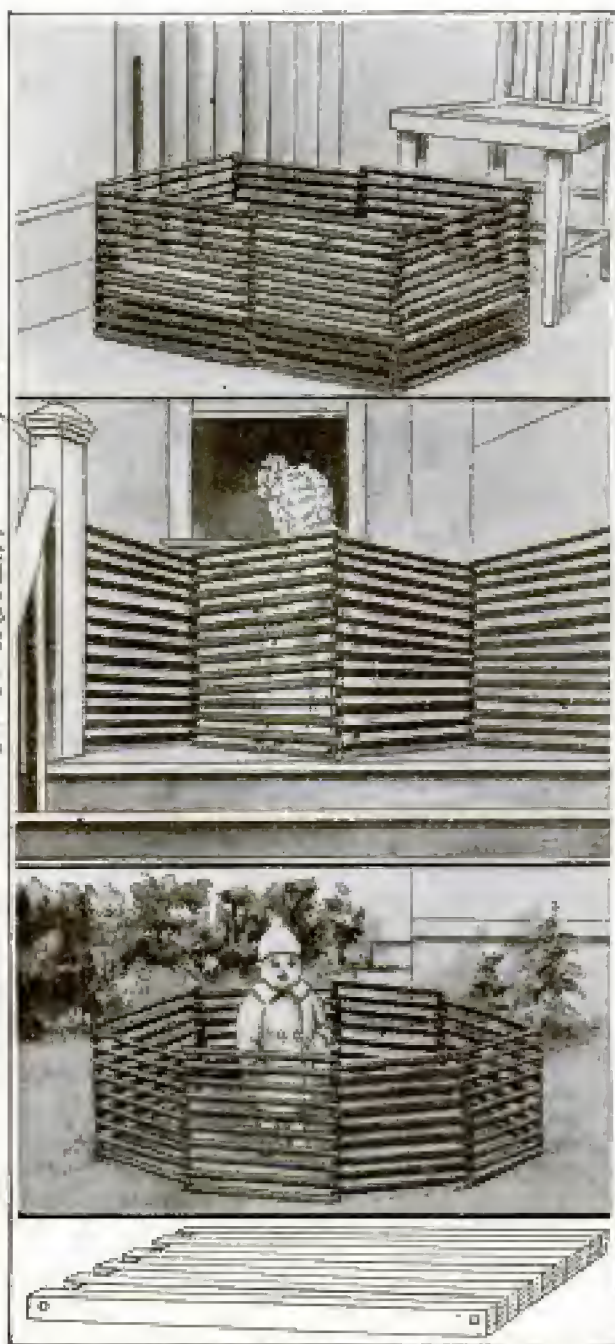
LATTICE BABY INCLOSURE LIGHT AND FLEXIBLE

Designed so that it may be used in a number of different ways, a collapsible fencing has been invented which performs a serviceable function for those who have small children to raise. It is made of light, horizontal slats and

Info:
E. J. Codd Company,
Baltimore, Md.

9481

divided into eight sections, all being flexibly connected. When used on a lawn, for instance, it may be set to form an octagonal corral, inside of



The Flexibly Jointed Lattice-work may be Used in Many Ways to Protect a Baby from being Injured When Left Alone

which a baby is in no danger of being hurt if left alone. The device may be straightened out and set across a porch entrance to safeguard a child from falling down a series of steps, or it may be used to guard a grate. When folded it is only 2 ft. long, 21 in. high, and 3 in. thick, and may easily be carried in a trunk when traveling.

HUGE SIZE OF PRESENT WAR SHOWN BY STATISTICS

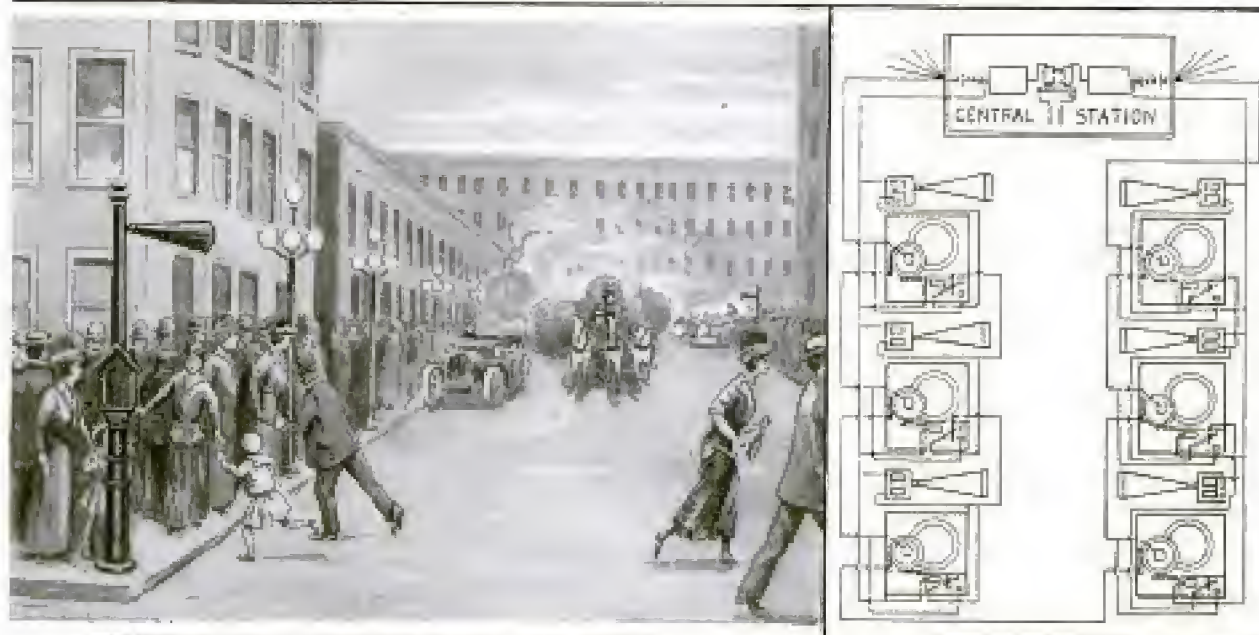
Figures which show in a striking manner the titanic proportions of the European war have recently been compiled in Germany. According to these statistics there are some 21,770,000 men engaged in the land and sea operations. Of this number it is estimated that 12,820,000 are enlisted on the side of the allies, and 8,950,000 on that of Germany, Austria, and Turkey. The population of the two hostile alliances is approximately 800,000,000 for the former, as against 150,000,000 for the latter.

The daily expense of the conflict at the present time is computed to aggregate approximately \$42,250,000, while the amount expended prior to last April is set at \$10,000,000,000. Excluding Italy from consideration, the annual cost of such a war would exceed \$15,000,000,000. If this amount were represented in German 1,000-mark bank notes placed one on top of the other, the stack, it is estimated, would extend to a height of about 20,000 feet, or approximately 400 yards less than four miles.

HORNS CLEAR STREETS FOR FIRE DEPARTMENT

To provide a quick and reliable means of clearing the streets for the fire department, the city of Pittsfield, Mass., has installed electric siren horns above the fire-alarm boxes along the principal thoroughfares. The horns are connected with each other by an independent circuit and are also connected with the regular fire-alarm circuit in such a manner that when an alarm is turned in from any box, the horn above that box and all those between the box and the central station will start blowing and will continue to blow until the apparatus is replaced in inoperative position, or the current is switched off at the central station. Forming part of the mechanism of the ordinary fire-alarm box is a wheel that bears against a contact bar, and through this contact

Boardman Mfg. Co.
84 N. Broadway, Portland, Oregon.



How the Streets of Pittsfield, Mass., are Cleared for the Fire Department by Electric Siren Horns; Electric Connection of Horns with Central Station Shown by Diagram at Right

electric current flows constantly. When an alarm is turned in this wheel makes one revolution. On the rim of the wheel are notches that break the circuit in a certain series, and in this way the number of the box is signaled through the action of a whistle magnet located in the central station. For operating the horns this wheel is provided with a lug which, as the wheel revolves, contacts with a second bar, closing a circuit that energizes a magnet located within the box. Through the action of this magnet a drop bar is released and the free end falls on a stud, closing a circuit that sets the horns to blowing. With the apparatus in this position there is nothing to prevent additional alarms from being turned in from the same box. The drop bar is restored to its original position by an attendant.

L. make

KIT FOR TREATING BITE OF POISONOUS REPTILES

A handy pocket kit for travelers and hunters, that contains the means for the immediate treatment of the bite of the rattlesnake or tarantula or the sting of the scorpion, has been placed on the market by a California druggist. The case in which the drugs are carried is made of nickelplated metal and is of

such a size as to fit in the upper vest pocket. The outfit contains a hypodermic syringe, bottles in which are sterilized water and permanganate of potash, and other antidotes for injection in the wound; tablets for internal use for stimulating the action of the heart, and a ligature. The drugs are said to be such as are used for treat-



ment by the best physicians. On the inner side of the lid of the case are full directions for using the remedies.

Large numbers of American motorcycles are being shipped abroad for military purposes. One domestic company has an order for 3,000 machines.

Cont: J. Bassett, 2768 Columbia St. San Diego, Calif.
Mfr: Monarch Drug Co. Inc. San Diego, Calif.

WHERE THE CHILDREN GO TO SCHOOL ON SKIS

Florence L. Clark, Bozeman, Mont.

The children of the hay ranchers, who live in the highest altitudes of the Gal-
practically the whole of the school year. With the exception of a few

weeks in summer, the mountain trails leading from the cabin homes to the schoolhouse among the pines are covered with snow, and much of the time the snow is so deep that the children can touch the telephone lines. The trails are kept marked continually by willow twigs stuck in the snow, these being renewed after each snowstorm. The children have been taught to throw themselves face down on the snow and to lie still until the blast has passed as a protection against



Montana Children Who Go to School the Greater Part of the Year on Skis

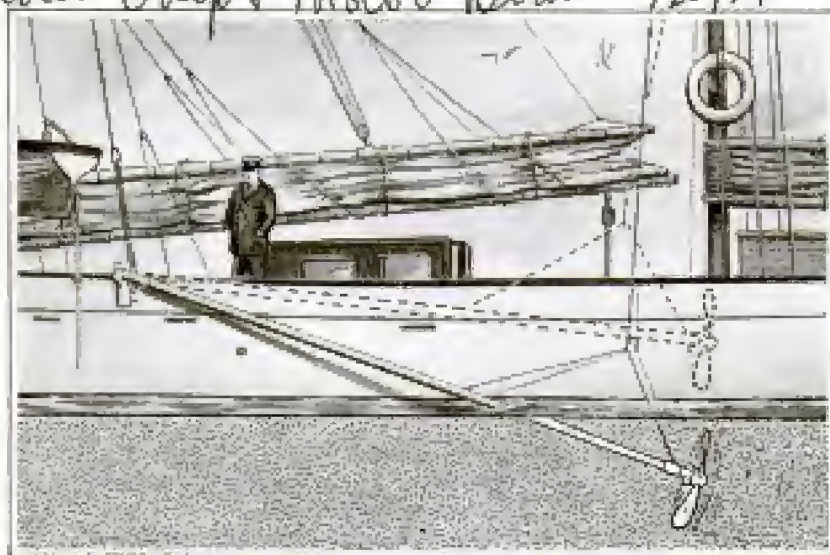
latin National Forest in western Montana go to school on skis during

the winds that sometimes sweep suddenly down from the mountain peaks.

NOVEL POWER INSTALLATION FOR SAILING YACHTS

For use on a sailing yacht, an auxiliary power plant has been designed which may be installed without requir-

ing either internal or external alterations of the vessel. The plan is being used successfully on an English craft and is apparently both economical and efficient. In this particular case, a 35-hp. internal-combustion engine is installed on the deck and concealed by a teak case. A reinforced rubber hose, fitted with a weight and suction rose at one end, extends overboard and supplies a continuous circulation of water for cooling the motor, while a flexible copper tubing carries off the exhaust gases. The propeller shaft is installed in outboard fashion at the side of the vessel, extending from the deck into the water. It is incased in a tube and connected at the deck end



By Extending the Propulsion Shaft over One Side of the Yacht, Alterations are Avoided

to a cross shaft reaching from the engine. This latter shaft is supplied with a universal joint, while the gear casing is mounted on a swivel bracket over the side of the vessel. The propeller shaft may readily be raised from the water or lowered into it as desired. The yacht on which this installation has been made is the "Arminel," a 74-ft. craft with a 10-ft. draft. With a three-blade, 31-in. propeller the motor drives the vessel at a rate of about seven miles an hour.

CAMERA SPECIALLY MOUNTED FOR SURGICAL PURPOSES

To simplify the work of taking photographs of important surgical operations performed in a Michigan sanitarium, an ingenious plan has been adopted which obviates the difficulty encountered when adequate facilities are lacking. A stereoscopic camera has been mounted on a vertical rod extending down from a chandelier immediately above the operating table. The lens is permanently focused so that preliminary adjustments are not required before making an exposure. A plate is always kept in the instrument and when a surgeon wishes to have a picture taken an attendant merely presses the bulb and the work is done.



COMBINATION TRENCH TOOL SERVES MANY FUNCTIONS

Several different implements are embodied in a combination intrenching tool which has been devised by a Cin-



The Intrenching Tool and Several of the Ways in Which It may be Used

cinnati inventor. It is slightly less than three feet in length and is not excessively heavy. At one end is a detachable trench shovel that is held securely in place by means of a large thumbscrew. By removing this, the steel plate may be utilized as an abdomen shield, or as a head protection when firing from a prostrate position before "digging in." A substantial saw is fixed in the handle like a blade of a pocketknife. When the shovel is removed this may be unfolded and used freely. At the opposite end of the tool is an ax and adz. When not in use, according to the inventor's idea, the device would be carried assembled and strapped to a soldier's belt.

Correspondents report that Germany is using a transparent material made of cellulose and acetic acid as a covering for aeroplane wings which renders the machine practically invisible at a height of 3,000 feet.

218
Anton Sumner,
Battle Creek, Mich.
Covr.

Covr: Roe S. Eastman, The Time-Star, Cincinnati, Ohio.
Illustrator: H. Stimpney, 115 W. Elder St., Cincinnati, Ohio.

A black and white illustration of a sailor in a white uniform and cap, sitting in a hammock. He is looking towards the right. The hammock is strung between two points, and there are some ropes and rigging visible in the background.

FOUR YEARS *in the* NAVY

PART II
THE BLUEJACKET ON
THE BATTLESHIP

by
LOUIS E. BROWNE

ON shipboard, reveille is at 5 a. m., when the master-at-arms—a battleship's policeman—"turns out" all bluejackets except those on watch during the night. An oaken barrel stave, whacked against the bottom of a sailor's hammock is the navy's alarm clock. In warm weather, many men sleep in the open air. A hammock contains a mattress and two heavy blankets—the sailor uses neither pajamas nor sheets. In the daytime, hammocks are rolled up and stowed in the nettings below decks. Warm, fresh water is portioned out in buckets and the men flock to the wash rooms and sheltered corners of the open deck to bathe. Many use the salt-water shower baths.

Decks are wet down, sanded and scrubbed; bright work is cleaned and, as each man has a small portion of the ship to keep clean, everything is ship-shape by 7:30, when breakfast consisting of cereal, meat, potatoes, fruit, hot bread, and coffee is served.

The galley and bakeshop, where all food is prepared, are above decks and open to the air on all sides. Ten men sit at a table, which when not in use is folded and suspended overhead. One "mess cook," or waiter, is provided for each table. The men may purchase delicacies such as pickles, jam, and cookies from the ship's canteen.

At 9:15 all go to quarters, when officers inspect their divisions. For 20 minutes all perform physical drill, which is followed by a wild run about the decks. Then the men don work clothes and go to drill. In turrets, on the signal bridge, and on decks they strive for perfection. No athletic team

in the work is more highly trained than a big-gun crew. Five times a minute, a 1,000-lb. projectile and powder is sent to the turret from the magazine and loaded into the rifle. The drill prepares men for target practice, which is preparation for war. Success brings prize money to the crew. Target practice is to the navy what the world's series is to baseball. Gunnery and engineering competition in the navy has created a fine service spirit. Each crew strives to outdo the others.

There are signal, collision, fire, general-quarters, first-aid drills, and many others. Morning drills are over at 11:30, when the smoking lamp for the crew is lighted. Fifteen minutes later the boatswain pipes mess gear, when the tables are set for dinner—the big meal of the day—which includes soup, chicken or meat, two potatoes, salad, dessert, and coffee. This meal is over at 12:30, when the bugler sounds "school call." Men anxious for promotion gather in the crew's library and under officer instructors study grammar, arithmetic, spelling, and technical subjects. Textbooks of all sorts are handy. Probably 175 men out of a battleship's crew of 900 take advantage of the service's educational offerings. Afternoon drills are over at 3:30, when the bluejacket's time becomes his own. Supper is at six o'clock. Hammocks are swung at 7:30, and all must be retired by "taps," at nine.

Bluejackets scrub and wash their own clothes, hammocks, and bedding. Because of the difficulty of making fresh water from salt water, the men must use sea water.

The day is divided into six parts called watches. Each man is on duty either on the bridge, in the fire room, or on deck about two watches out of the six. The cooks and bakers stand watch about nine hours straight but have "all night in." A sailor has his rest uninterrupted but one night out of four.

Leisure time never hangs heavy upon a bluejacket's hands. He can always stretch full length upon the deck in the sun and "cork off." Cards, checkers, backgammon, and other games, are popular. Boxing is the sailorman's favorite sport, and there is hardly a bluejacket who does not believe himself to be a "white hope." All crews own their own piano, piano player, or phonograph. These, with glee clubs and quartettes, furnish constant entertainment.

Every large ship has a band which plays at noon and during the dinner hour. All bluejackets are adepts at the tango and other fancy dances. At night a large screen is often stretched on the quarter-deck and the ship's motion-picture machine is set up for an hour's entertainment. Each ship crew owns a couple of dozen films which are exchanged with other ships of the fleet.

When in port, ships give smokers to the crews of other ships. Such a treat must always be returned. A stage is erected at the extreme end of the quarter-deck. The rails and masts are brightly illuminated with electric-light bulbs; the officers of the two ships are seated nearest the stage and then in a solid mass come the crews, stretching as far forward as the mainmast. The program is varied—officers often taking part. Singing, glee-club music, dancing, and jokes of which the commanding officer, the admiral, and the younger officers are usually the butts, precede the boxing matches, which are the features. First comes the battle royal. Four men are blindfolded and with tin cups in one hand and pillow-like boxing gloves on the other, take corners in a regulation prize ring. At the word "go" they must advance to

the center, tapping the tin cup on the deck. When they locate one another, by the tapping, they punch—more often missing the mark by several feet than hitting. The winner, the man who remains in the ring longest, gets a prize. Six-round sparring bouts follow.

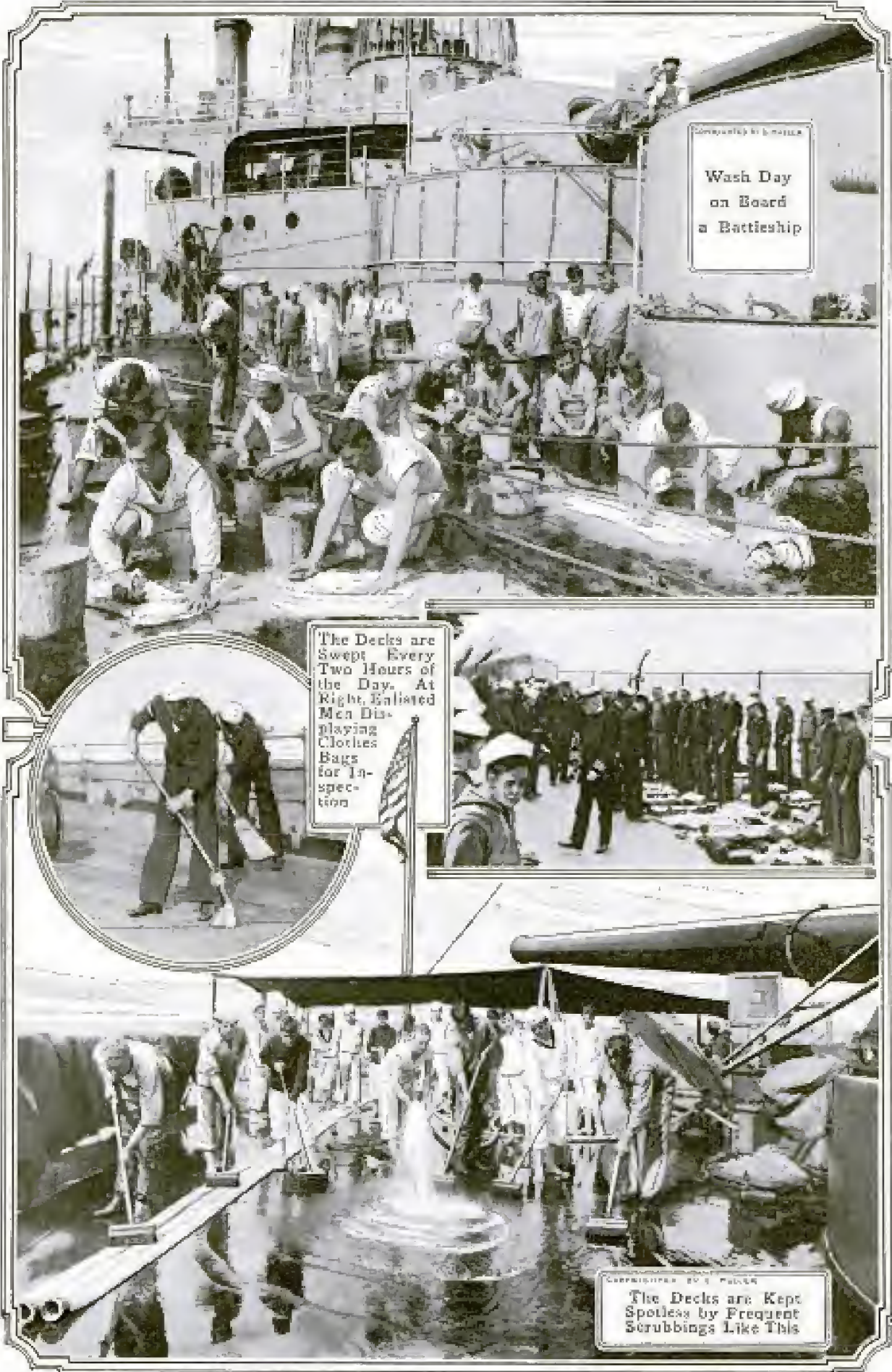
A race is the big event of the navy. Every ship has a highly trained crew of 10 men upon whom the bluejackets will bet their last dollar. Specially constructed cutters, used as race boats, are fitted with rolling seats and movable ballast. In the center of the cage mast of a battleship there are big chest weights at which the race-boat crew pulls for two hours every day. In port the crew pulls in the boat. The crew has a training table. The race covers usually two to five miles of open water. During its progress the men flock to the tops and upper works. Excitement runs high, and a battleship's crew will sometimes wager a pool of \$40,000 on its race boat. There are many racing trophies worth trying for, the chief of which is the Battenburg Cup now held by the "Florida."

A lifeboat crew works in an element of chance. When a man falls overboard a marine sentry drops the automatic buoy into the water. The man swims to it. At night it spouts fire—in the daytime dense smoke. The bugler calls away the lifeboat, a flag is hoisted at the fore, and at night a gun is fired. The crew of six men and a coxswain, always standing by, can launch its boat in less than a minute. Lifeboat drills are a regular feature and are held frequently.

A battleship has all sorts of athletic teams—baseball, football, basketball, and track. During the season the teams from various ships hold series for the championship of the fleet. The navy introduced baseball in China. They play wherever they happen to be—Cuba, India, or South America. Coaches are secured from the naval academy and young officers play upon teams with the men.

Many players join the big leagues after leaving the service.

HOW THE SHIP AND ITS CREW ARE KEPT CLEAN

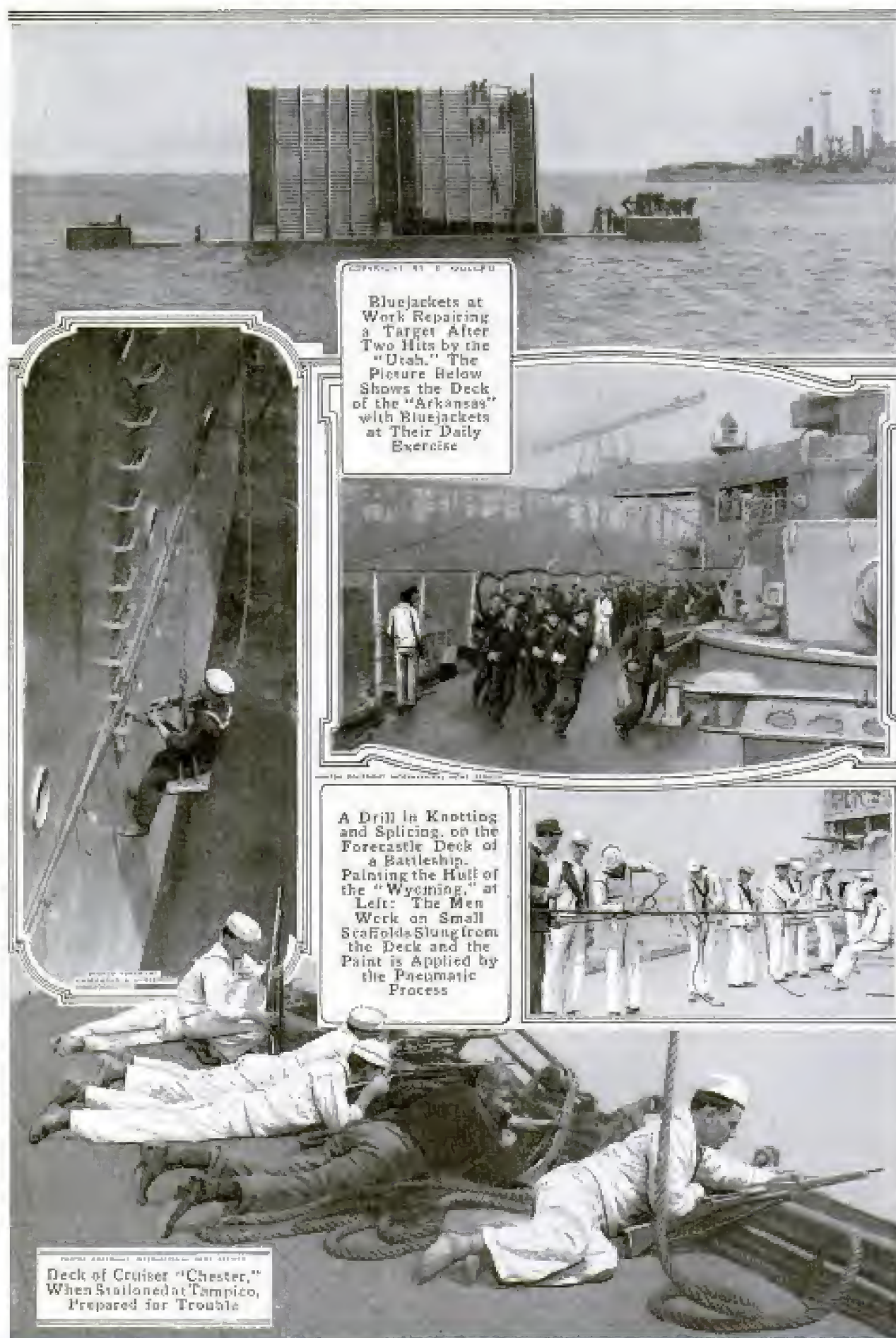


Wash Day
on Board
a Battleship

The Decks are
Swept Every
Two Hours of
the Day. At
Right, Enlisted
Men Dis-
playing
Clothes
Bags for In-
spec-
tion

The Decks are Kept
Spotless by Frequent
Scrubbings Like This

THE DRILLS THAT MAKE THE ENLISTED MEN



Bluejackets at Work Repairing a Target After Two Hits by the "Utah." The Picture Below Shows the Deck of the "Arkansas" with Bluejackets at Their Daily Exercise

A Drill in Knotting and Splicing, on the Forecastle Deck of a Battleship. Painting the Hull of the "Wyoming," at Left: The Men Work on Small Scaffolds Slung from the Deck and the Paint is Applied by the Pneumatic Process

Deck of Cruiser "Chester," When Stationed at Tampico, Prepared for Trouble

PROFICIENT IN SEAMANSHIP AND FIGHTING



Target Destroyed by Shell Fire from the "Texas": Picture Below Shows Gun Crew and Five-Inch Gun on the "Arkansas," and One at Right, Bridge of "North Dakota"

Repairing Targets After a Run at Target Practice

How a Field Gun is Unloaded from the Barge and Rushed through the Surf in Making a Landing

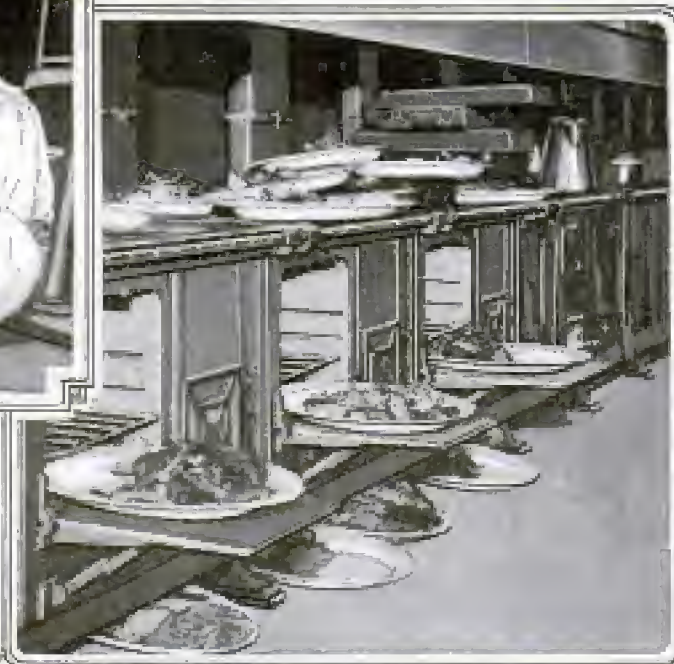
HOW THE "MESS" IS PREPARED AND SERVED



Following Reveille, which is sounded at 5 a. m., the Bluejackets are kept busy putting the ship in order until 7:30. When breakfast is served. The picture at the left shows the kind of tables and benches used, while the one below shows the Bluejackets at breakfast. Ten men eat at each table.



The Galley and Bakeshop, where all food is prepared, are located above deck and are open to the air on all sides. At the right is shown a Thanksgiving dinner ready to be taken from the ovens, while the picture above shows Bluejackets at work peeling onions for the next day's hash.



SCHOOL WORK AND DISCIPLINARY BARRACKS



COPYRIGHT,
F. H. HOWELL

When an Enlisted Man Commits an Offense That Merits Severe Punishment but Is Not Serious Enough to Warrant a Prison Sentence He is Sent to the Disciplinary Barracks. Here, in an Attempt to Make Him into a Better Man Before He is Returned to the Service, He Is Sent to School and is Subjected to Constant Drills. This Picture Shows a Squad at the Puget Sound Disciplinary Barracks Drilling with a Torpedo-Defense Gun.

Below: Squad at the Disciplinary Barracks Drilling in the "Hollow Square," a Formation of Vital Importance When a Small Body of Troops is Attacked from All Sides. The Picture at the Right Shows a Class in Arithmetic on Board the Battleship "Tennessee." School Work Forms Part of the Daily Routine for the Enlisted Men during the First Two Years of Enlistment.



WHAT THE ENLISTED MAN DOES WHEN OFF DUTY



The Bluejacket Has Access to Literature of All Types

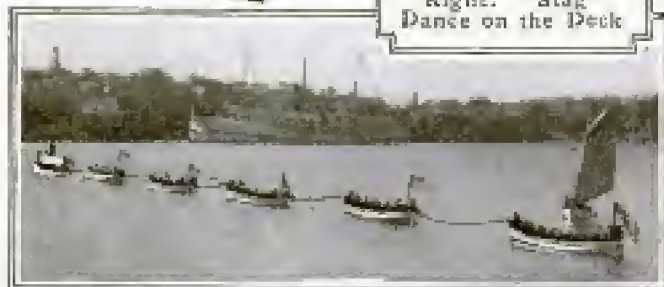
Many of the Battleships are Provided with Pool Tables: The One Shown at the Right is Installed on the Gun Deck of the "Wyoming"



Racing Crew of the Dreadnaught "Florida" Returning to the Ship after Winning the Battenburg Cup in a Hotly Contested Race



Above: "Good Night"
Below: Going Ashore
Right: "Stag" Dance on the Deck



MOVEMENT TOWARD BREVITY IN BUSINESS LETTERS

According to advices from the American ambassador at Berlin, many commercial houses in Germany are abolishing the practice of employing "unnecessary terms of politeness" in their business correspondence. Introductory phrases such as "Gentlemen," "Dear Sir," and "Sir," as well as "Yours truly" and similar concluding terms, are being dropped. Certain companies go so far as to attach printed slips to their letters explaining, "Following the example of other firms, I also omit from my business letters the unnecessary terms of politeness, as well as assurances of self-evident esteem. I request that you reciprocate in your correspondence with me."

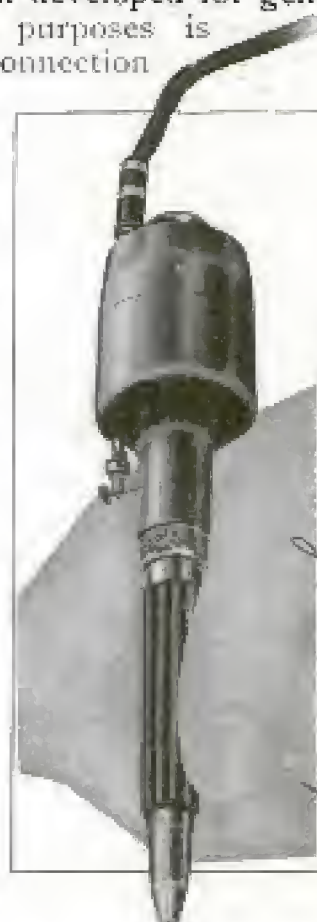
CONVENIENT PLATFORM USED BY SIGNPOST PAINTERS

In repainting warning signs at crossings along a railroad right of way, a portable platform is used instead of ladders and scaffolds by employes of an eastern company. It is approximately eight feet in length and is secured to a signpost by a simple wedging arrangement. The flooring is built on an arm, one end of which is extended so as to fit about three sides of a square post. When this is put in place a heavy bolt is pushed through holes in the two steel-reinforced planks, and the platform is raised to the desired height. A wedge is then driven between the bolt and the post, holding the device firmly in place.



MINIATURE ELECTRIC MOTOR DRIVES DENTAL DRILL

One of the smallest electric motors that has ever been developed for general commercial purposes is being used in connection with a dental drill of new design. The purpose of the drill is to replace the bulky apparatus commonly used. The motor, which weighs only 5 1/4 oz., has a diameter of 1 1/4 in. and a length of 1 3/4 in. It normally operates at a speed of 15,000 revolutions a minute and may be driven by either an alternating or direct current. A control switch which may be operated conveniently by a finger is mounted on the motor. While it has been built particularly for dental purposes, it may also be used wherever a self-contained, hand-held and controlled power device is needed for driving a light instrument.



BIG CLOCK TRIPLES SPEED AFTER DELUGE OF RAIN

Following a heavy rain at Springfield, Mass., recently, a large clock in the municipal building developed uncommon speed in the downward trip of the big hand from 6 to 6:30 p. m. In moving from the hour to the half-hour points on the dial the indicator covered the distance in approximately 10 minutes. Investigation disclosed that the hand, which is hollow, had been filled with water during the storm. This additional weight was the cause of the trouble.

Wally Concular + Brady Report 6/30/15

151

1801 East 93rd Street, Cleveland, Ohio

Mfr:

Shelton Electric Co.
30 East 42 Street
New York City

268

Henry H. Goodrich
24 Commonwealth Ave.
Boston, Mass.

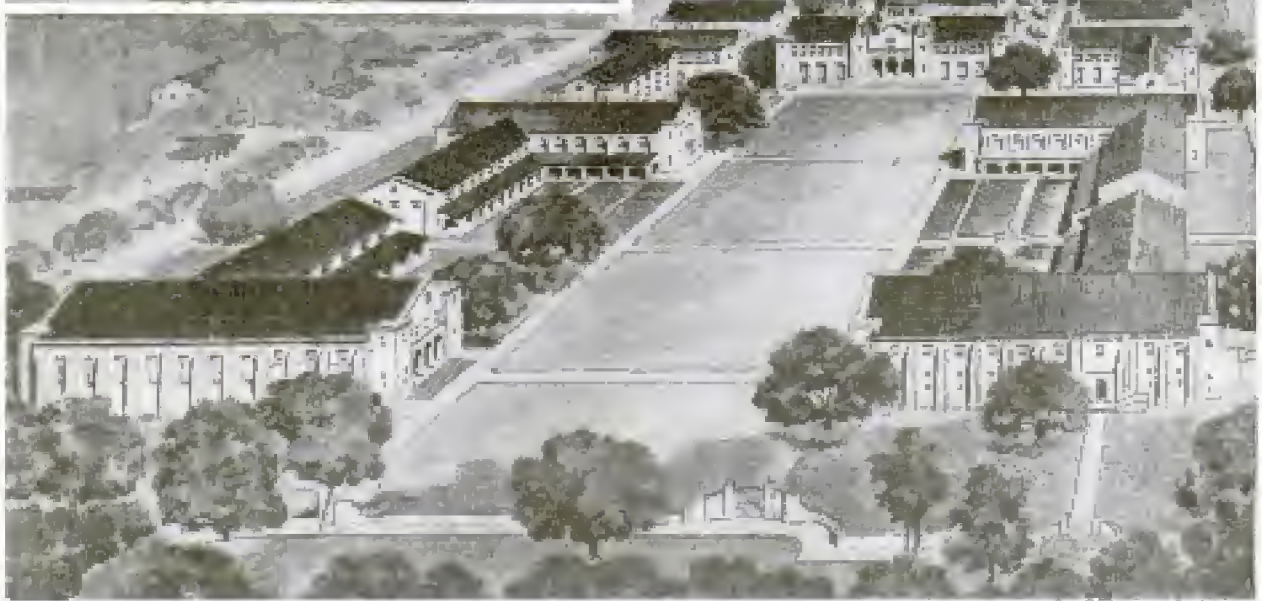
BIG TREES ARE PRESERVED IN PLANNING CAMPUS

76 In designing the campus of the Throop College of Technology at Pasadena, Cal., the architects devised a plan which allows the various buildings of the institution to be grouped symmetrically without necessitating the removal of even one of some 40 large oak trees scattered about the grounds. As a result, the new campus, when com-

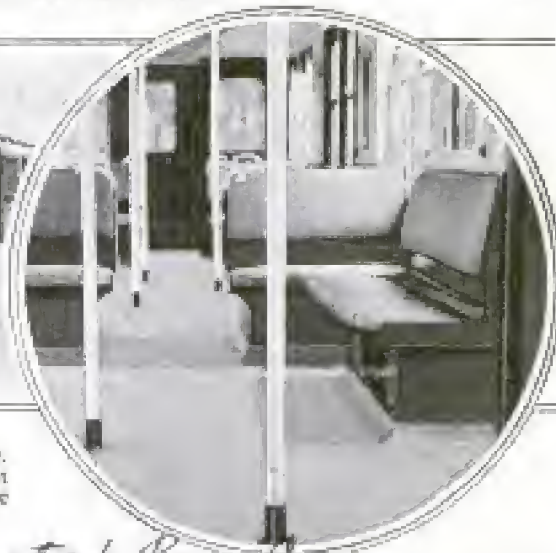
pleted, will have the advantage of being shaded by full-grown trees at the outset, while from a landscaping viewpoint the arrangement fortunately will be as harmonious as if the buildings had first been built and the grounds then planted with young trees.

In designing the structures, which are of Spanish architecture and grouped to form a large court, airy arcades and broad, overhanging eaves have been provided along the front sides so that the students will be able to pass between the various buildings without inconvenience during the rainy season. The central building, which houses the administration offices and is now in use, has a large dome. Instead of allowing the space beneath this, which is excellently lighted, to be wasted, the place has been utilized for the college library. Bookshelves are placed around the wall and an octagonal study table set in the middle of the room.

ⒸGlass containers for screws, nails, hinges, and other small supplies are coming into general use in the workshops of London.



Instead of Allowing the Space Beneath the Dome to be Wasted, the Circular Room has been Devoted to the College Library. The Lower View Shows How the Buildings were Planned to Preserve 40 Oak Trees



Three Double Doors are Arranged on Each Side of a Car. The Right-Hand View Shows the Design of the New Seat Which has been Adopted; Cement Floors and White Enamel Make the Cars Easy to Clean

Used by New York Consolidated Ry. Co.
**CARS OF NEW DESIGN BUILT
FOR GOTHAM SUBWAYS**

183 Cars larger and better than those heretofore operated and embodying various features for safety, comfort, and sanitation, are being placed in service in the New York subways. They are of steel construction and built a foot wider and 16 ft. longer than former cars, providing seating capacity for 78 persons and auxiliary accommodations for a score more.

The interior of the cars is finished in white enamel. The floor is made of a cement composition which allows it to be flushed and thoroughly washed at the end of a run. Posts replace the proverbial straps, while the seats are especially designed for comfort. In making these, the measurements of a large number of persons were taken in order to determine a pattern which would best suit the requirements of the average New Yorker.

Platforms have been eliminated. Three double doors, facilitating the loading and unloading, are arranged on each side. These are operated electrically and controlled by a guard stationed at the middle entrance. A train cannot be started until each door is closed and locked, at which time the motorman is signaled automatically. An emergency lighting system, receiving current from storage batteries, is put in operation when contact with the third rail is broken or the regular power temporarily cut off.

So as to stop the trains more uni-

formly, two brake shoes are used on each wheel. The braking power is regulated proportionately to the passenger load. The power can be cut off and the air brakes applied by a guard in any car, should an emergency arise. The operating lever on the controller is so built that a train stops in case a motorman for any reason takes his hand from it.

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**MACADAM STREETS WASHED
TO REMOVE DUST**

Ordinary sprinkling failed in allaying the dust on the macadamized thoroughfares of Dundas, Ont., and, instead of having them oiled, the municipal fire department was assigned the task of thoroughly washing them. The streets were followed from end to end, and heavy streams of water played



Firemen Washing the Macadam Streets of Ontario Town to Remove the Dust

*Cont: R. Dugmont, Box 129,
Dundas, Ont., Canada.*

upon them until the silt had been deposited in the gutters, or carried into the sewers. Although much of the surface material, which might have been saved by a binder of some kind, was in this way wasted, the roads nevertheless were cleaned.

SINGLE-UNIT POWER SAW FOR CRATE MAKING

Designed especially for installation in shipping rooms, a self-contained,



The Saw may be Suspended from an Overhead Beam and Used in Limited Space

power swing saw has been devised which is intended for cutting crating materials, and doing similar work. The compactness of the apparatus enables it to be fitted to an overhead beam in some out-of-the-way corner, when working space is cramped. It is made in a single unit with an electric motor

mounted at the top of the cast-iron saw frame. The arm of this latter member mounts a rotary saw and guard at its lower end and is encircled by the driving belt leading from the motor. The device is counterbalanced so that it automatically returns to its normal position and cuts off the current when not in use.

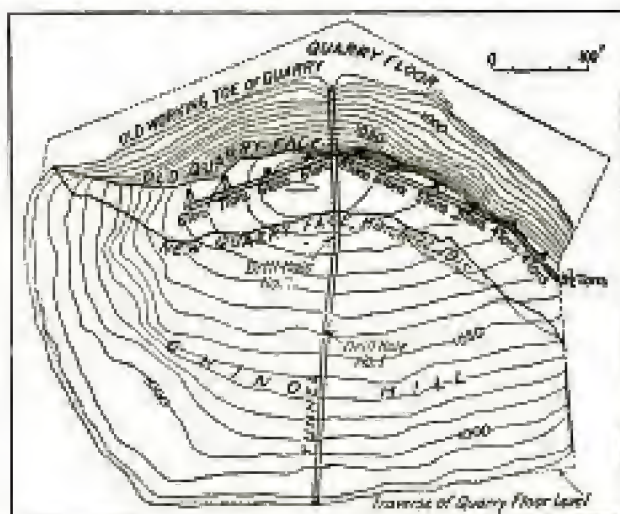
POLO-PONIES COMMUTERS AT SAN FRANCISCO

Commuter service between the polo grounds and San Mateo was established for the ponies taking part in the tournament held recently at San Francisco. This was made necessary because adequate room and facilities were lacking at the grounds for the care of all of the animals participating in the event. At San Mateo, 20 miles away, the accommodations were available, however, and this led to the practice of shipping the ponies back and forth night and morning. For this purpose an all-steel car, divided into individual stalls, was used.

CARLOADS OF EXPLOSIVE USED IN SINGLE BLAST

What is believed to have been the greatest single blast that has ever been fired, was touched off recently at the quarry of a Pacific coast cement works. Fifty-eight tons of explosive was used to loosen approximately 400,000 tons of rock on the face of a hill.

Instead of planting the powder in ordinary drill holes, it was placed by tunneling through from the rear of the



COURTESY OF ENGINEERING NEWS

Manner in Which a Quarry was Mined with 58 Tons of Explosive, Which was Fired in One Blast

hill and extending drifts on either side of the main bore to parallel the face of the quarry. The various mines were

The Revs-Kaether Electric Co.,
610 Baymiller St., Cincinnati, Ohio.

Quarry W. J. J. J.
327 Mac Donough St. Brooklyn, N.Y.

Twenty-Six Tons of Explosive was Discharged in One Blast in Order to Break Up This Limestone Cliff near Richard City, Tennessee



Laying the Fuse to Touch Off Simultaneously 54 Charges of Explosive

In This Single Blast Enough Rock was Displaced to Supply the Cement Plant with Material for a Period of Eight Months

then placed at intervals of a number of yards along the drifts, the individual charges varying in size from $3\frac{1}{2}$ to 7 tons each. Contrary to what might have been expected, there was little vibration and noise attending the discharge.

Another blast, thought to have been second only to the aforementioned one, was set off by a cement company at

Richard City, Tenn., in order to break up a large limestone cliff which was being worked. There, 26 tons of explosive was employed and approximately 300,000 tons of rock—enough to keep the plant supplied for eight months—opened up. In this instance, however, 54 drill holes, each about 100 ft. in depth, were bored into the cliff to receive the charges.



Fishing Stages on the Shore
of a Small Bay on
Newfoundland's Coast

FISHING STAGES ON COAST OF NEWFOUNDLAND

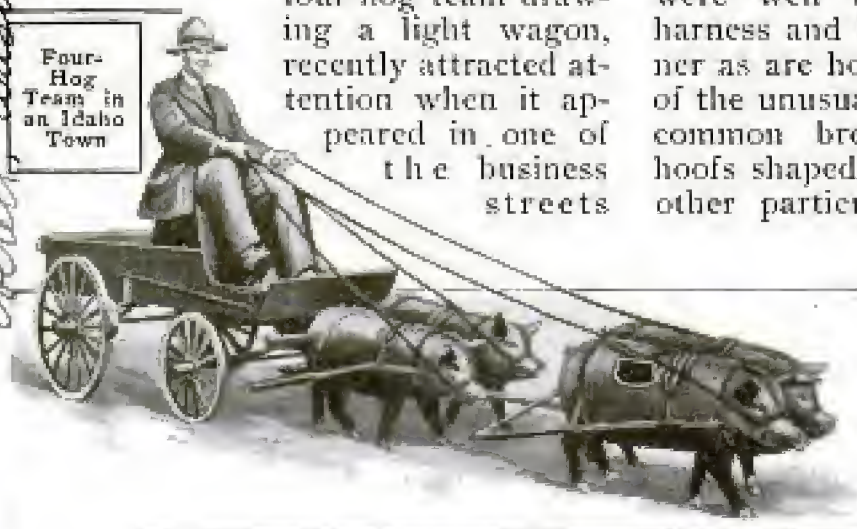
Along the rugged coast of Newfoundland, where the rock cliffs verge upon the perpendicular, it is not an infrequent sight to see an extensive latticework of fishing stages. These frameworks, made principally of poles

and in many instances appearing crude in construction, are provided in order that incoming fishermen may have places on which to throw their catches when they draw up their boats. Above the stages there are ordinarily a number of small shacks where fish are cleaned, prepared for shipment, and packed for export.

TEAM OF HOGS IS DRIVEN THROUGH CITY STREETS

As curious a turnout as has probably ever been seen on any thoroughfare, a four-hog team drawing a light wagon, recently attracted attention when it appeared in one of the business streets

at Lewiston, Ida., during the course of a celebration. The odd draft animals were well fitted in specially made harness and hitched in the same manner as are horses. As an added touch of the unusual, the hogs are not of the common breed, but have uncloven hoofs shaped like those of a mule. In other particulars, however, they are quite of the ordinary appearance. It is said that the animals are well trained and drive nicely, although intermittently they are apt to do considerable squealing, to the amusement of the crowds.



Four-Hog Team in an Idaho Town

Mrs. Janet M. Cummings.
75th Avenue, New York City.

Cont: Chas. E. Wilder.
1232 Hoyt Avenue.
Everett, Wash.

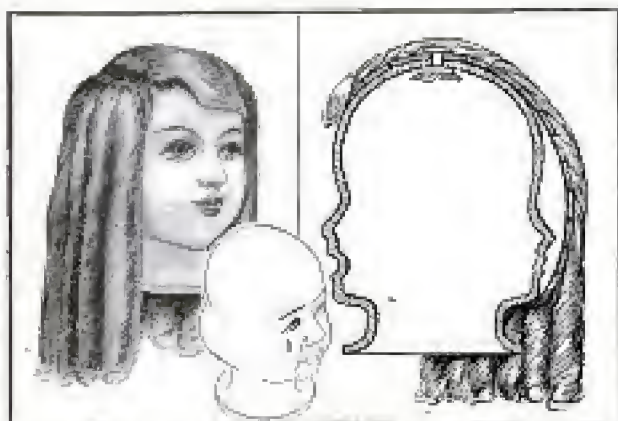
Leonard Y. Painter,
La Grange, Mo.

RAILWAY TELEPHONE LINE CRIPPLED IN ODD WAY

As an illustration of the case with which a telephone line may be disabled by the carelessness of its user, a circuit operated in connection with a railway block system in an Iowa town was recently crippled by two pins. The wires extended down a wall at one side of the station agent's desk. He was in the habit of using the insulation on these as a pin cushion. Unwittingly he stuck a pin in a block-line wire and another in a ground wire. The heads of the two pins touched. This naturally grounded the current. Division linemen, after considerable delay, finally found the trouble source.

DOLL BABY WITH TWO FACES OF DIFFERENT EXPRESSION

Two dolls are virtually provided in one by an ingenious plan lately worked out by a New York woman inventor. The head of the doll is made with two faces, one on each side. A heavy wig is so attached that it may be turned to



One Face Shows the Doll Crying While the Other Countenance Is Placid

expose either of the faces while covering the other. The expression is different in each case.

STREET CAR MADE INTO REPAIR SHOP

After having outlived its usefulness in the transportation world, a street



This Quaint Repair Shop Was Originally a Street Car

car has been dismantled from its trucks and installed as a repair shop on one of the principal streets of Battle Creek, Mich. The interior is fitted up in such a way as to provide plenty of room for working, and at the same time presents an inviting appearance to customers. The unusual appearance of the quaint shop with its novel signs and its flower garden serves as an effective advertisement for the owner's business.

GAS PIPES WELDED WITH OXYACETYLENE FLAME

By using the oxyacetylene flame, with soft-steel wire as the welding material, the joints of 4,000 ft. of 4-in. gas main recently laid in a city in North Carolina were so successfully welded that the joints are not only gas-tight but are as strong as the pipe itself. The pipe was sent to the site with the ends beveled and ready for welding. In one afternoon 15 leakless joints were made with only one torch, the apparatus being moved about 20 feet after each weld. It was found that the joints could be welded faster and better in the trench than at the ground

Cord: Hilton Hillmore,
Battle Creek, Mich.

White Plains, N.Y.
Mary C. Haverth.

level, as the torch appeared to draw an excess of oxygen from the air when exposed to the wind with the result



Welding the joints of a Gas Main by Means of the Oxyacetylene Torch, with Soft-Steel Wire as the Welding Material

that there was a tendency to burn the welding material. The wire used was No. 8 gauge, and about $3\frac{1}{2}$ feet was required for each joint.

RESERVE RATIONS CARRIED BY FRENCH SOLDIERS

Every soldier in the French army carries emergency rations which are not to be used except in case of absolute necessity. So far, the commissary service has worked with the regularity of a clock, and the troops, it is said, have never once had to fall back on their reserve supplies. The problem of providing food punctually day after day for thousands of men scattered

over a wide territory, some of them changing their positions frequently, requires an almost perfect-working organization. Each day food is distributed for use on the following day, and this is done at specified railway points from which the provisions are carried to the front by wagon. When there are no railways available, motor cars are used in the place of trains. Should neither trains nor motor cars arrive, the forces would fall back on their reserve rations.

OFFICIAL MAP OF GOTHAM STREETS IS DRAWN

For the first time a comprehensive and accurate official map of New York City's streets and outlying territory is available. Aside from the area within the corporate limits, it covers the territory adjacent in Jersey, Westchester County, and Long Island. It is uncolored, making it possible for the several municipal departments, for which it is primarily intended, to emphasize their respective fields of activity. It is drawn to a scale of 2,000 ft. to the inch and in its finished form is 8 ft. square.

Great pains were taken to assure minute accuracy. The original drawings were made on a heavy paper, to the scale of 600 ft. to the inch, which from humidity and temperature changes showed variations in length ranging between .012 in. and .017 in. to the foot, which is much less than the similar changes in tracing cloth. Twenty-one of these sheets, each 8.01 ft. by 3.53 ft., were employed. In making certain tracings from other charts, glass-top tables, illuminated from beneath by three powerful electric lamps, were used, enabling the draftsmen to trace through two thicknesses of paper without difficulty. Small electrically driven disk erasers were employed in making all the necessary alterations, and it was found that the erased surfaces were indistinguishable from the original wherever these devices were used. The exact widths of the thousands of streets are shown. To accomplish this an instrument which made it possible to

The Great O-Lite Co., Inc.,
800 Broadway, Indianapolis, Ind.

Army & Navy Journal,
3/6/15

W. M. Murphy, 288 Broadway, N. Y. C.

POPULAR MECHANICS

567

"Engineering Record" May 22, 1915



Cont: Karl Stefan,
Norfolk, Nebr.

draw both margins of a thoroughfare simultaneously was devised.

A platform finished like the surface of a drafting table and 27 ft. by 28 ft. in dimension, was provided for joining the various sheets making up the complete map. Since each section of the chart was divided into even minutes of both latitude and longitude, the assembling and matching was materially facilitated.

THOUSANDS OF SEA SHELLS FORM ELABORATE ARCADE

9958 After spending several years collecting sea shells, a resident of Jacksonville, Fla., has constructed an ornate arcade about his home which is one of the sights of the town. Surmounting the arched columns, an elaborate, heavy design has been worked out, through which climbing vines are entwined. The appearance of the structure, which serves to screen the grounds from the street and add to the privacy of the place, is quite out of the ordinary, although it may not conform to many persons' sense of what is attractive.

DUAL STEERING MECHANISM FOR FARM TRACTOR 9

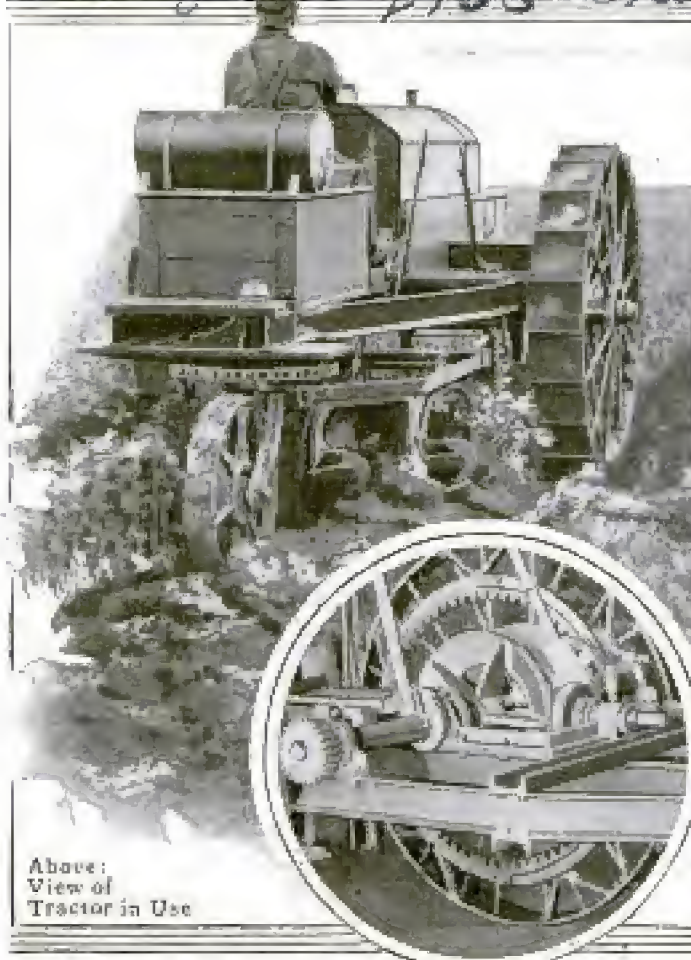
For general farm purposes a power tractor has been constructed which is provided with two separate steering arrangements. One of these is operated by means of two levers which control a transmission mechanism that allows the driving wheels to be propelled in opposite directions. This enables the tractor to turn in very close quarters and makes it an easy matter for the operator to send it into what otherwise would be awkward places when plowing is being done. The mechanism responsible for this function is very simple. Two friction disks are mounted several inches apart and parallel with each other. A shaft carrying two cone clutches, one facing the other, passes between them. The use of one lever thrusts one of the cones against the edges of the disks, driving them in opposite directions. The engagement of the other clutch reverses these directions. Thus either of the wheels, when this transmission plan is used, may be driven in either a forward or backward direction and opposite to

William H. Watson,
Morton, Pa.

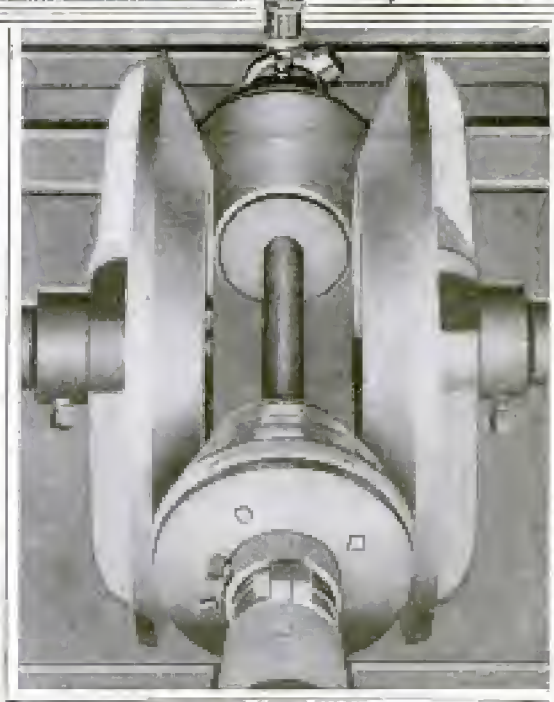


It Required Several Years' Time to Collect the Shells Used in Erecting This Ornate Structure

Inventors: J. A. Colwell }
 Albert Kennedy } Norfolk, Nebr.
 725/12-13
 Albaugh-Dover Co. Marshall Rd., Calhoun
 7100
 POPULAR MECHANICS 569



Above:
View of
Tractor in Use



This Gives an
Idea of the
Arrangement
of the
Transmission
Set and the Way It is
Mounted in Relation to
the Driving Wheels of the Machine

the direction traveled by the other. The second steering apparatus is similar to that of a motor car—an ordinary steering column. This is used for all ordinary purposes.

engaged in building instruments to supply the local demand.

In appearance the ukulele is similar to the Spanish guitar, although smaller in size. It has four strings and is intended for the accompaniment of other instruments or the voice. It has a soft, melodious tone that brings out the weird romance of the island songs.

A. W. Simon, Los Angeles

MANY HAWAIIAN UKULELES NOW USED IN STATES

Few musical instruments have ever come so quickly into popular favor in this country as has the Hawaiian ukulele during the last three or four years. It is estimated that in 1914 alone between 20,000 and 25,000 of these small instruments were purchased, probably 90 per cent of which were sold along the Pacific coast, where they are becoming quite commonly used.

A very large proportion of the ukuleles sold here are not imported, as is commonly believed, but are manufactured in a mid-western city, where probably as many of them are made as in Hawaii. There are also a few individual makers in California who are



Harmony Co. 1744 N. La Salle St. } Chicago
 Regal Musical Instrument Co.
 3211 Grand Av.
 Globe Mfg Co., St. Charles, Ill.
 Copyrighted material

39
 Mrs. Anna Myers
 4013 Berendia Ave.
 Los Angeles, Calif.

Mr. J. R. Schmidt, 3557 St. Charles Place,
Hyde Park, Cincinnati, Ohio

cont:

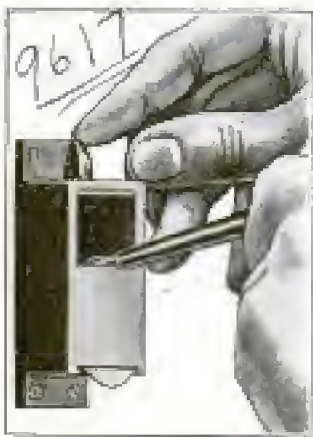
"Office Appliances"

POPULAR MECHANICS

PEN-POINT EXTRACTOR MADE AS OFFICE APPLIANCE

For removing worn-out pen points from their holders without staining the fingers with ink, a convenient device has been introduced which is intended to be attached to a wall or a side of a desk. It is made of metal somewhat in the form of a box

and is provided with a hinged door which serves as a gripping agent. By inserting a point in this and pulling, a pen may be readily removed.



GALLONS OF FLIES CAUGHT BY SIMPLE TRAP ²³¹

With a homemade sugar-barrel trap, a Cincinnati man recently succeeded in catching 43 lb. of flies in less than a week. A device similar to the one used by him may be made easily, and when employed, will materially lessen the number of flies around a house.

In constructing the trap, both ends of an ordinary barrel are removed. A screen cone about 18 inches in height is fitted in the inside of this with its outer edge securely tacked to the rim. The tip of the cone is cut off, leaving an opening approximately an inch

in diameter. Screening is fastened to a hoop and used to cover the barrel, which should be supported two or three inches from the ground on short legs. This constitutes the trap.

The bait may be sugar or some other sweet which will attract the flies but not make their wings sticky. This is put in a tray placed on the floor or ground immediately beneath the cone. After eating, the flies, attracted by the light above them, will rise through the cone and enter the barrel, from which they cannot escape. When it is time to empty the trap a small amount of boiling water should be poured over the flies.

Ammunition and firearms exported from the United States during the 10 months ended last May were valued at \$37,000,000, according to an authoritative statement issued recently at Washington.



After Using the Trap Six Days, This Tubful of Flies was Removed



One of the Steamboats Engaged in Fire-Patrol Service on the Peace River in Canada

The Railways are Constantly Patrolled by Men on Velocipedes with Equipment for Extinguishing Fires

PATROLLING THE FORESTS OF THE FAR NORTH

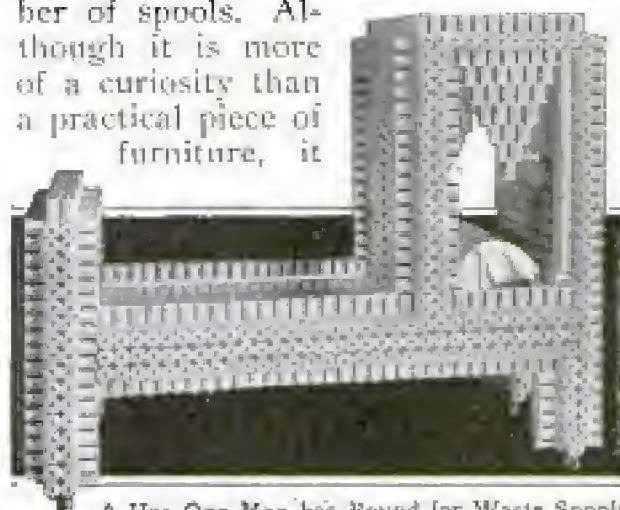
The forests of the northern sections of Canada that are suitable for settlement are now being carefully guarded against fire by the Dominion government. Patrols are maintained on land, particularly along the lines of the few railways, and the Peace and Mackenzie rivers are regularly patrolled by steamboats equipped for fire fighting. In sections where railways have not been built the rivers of the North are practically the only avenues of travel and the danger from fire is almost entirely confined to the woods along their banks, since a camp fire or a careless smoker may easily start a serious blaze. The steamers used in the work are propelled by rear paddle wheels and are of shallow draft. Because of the bitterly cold winds encountered during a large part of the navigation season they are entirely housed in, with the exception of the forward deck. The mounted police is charged with fire-patrol duties, and along the railways are patrolmen who follow up the trains on velocipedes, prepared to extinguish small blazes or, if necessary, to summon help from the nearest station. Each railway patrolman is equipped with two pails, two shovels, and blankets, in addition to his personal equipment.

The superdreadnaught "Texas" is the first American warship to be equipped with a laundry and drying room.



CHILD'S BED WITH CANOPY

During his leisure hours an Ohio man has constructed a novel bed for a child by using a few boards and a number of spools. Although it is more of a curiosity than a practical piece of furniture, it



A Use One Man has Found for Waste Spools

is nevertheless substantially built and serves its purpose adequately. The spools are arranged in parallel rows, covering the bedstead and its canopy completely and giving a very ornate appearance. It is slightly more than three feet in length and about 30 inches in height at the head, a size which would also allow its use as a doll's bed.

Made by resident of
Camp Washington, suburb
of Cincinnati

Copyrighted material

Felix J. Roth, Neaman Ave. Cincinnati, Ohio.

COTTON USED FOR MAKING 78 GEARING

Pinions made of cotton, highly compressed and held between two steel side plates, or shrouds, are coming into



The Cotton in the 165-Pound Bale Shown in the Used in Making

Background was All These Two Pinions

wide use on account of their wearing qualities as well as their noiselessness in operation. Like rawhide and other nonmetallic pinions, they are run in mesh with metallic gears. The teeth are elastic but strong enough to be used wherever cast iron can be used. They are not injured by oil, water, or changes in temperature, and are immune against attacks of rats or mice. In making the pinions the cotton is first compressed by heavy hydraulic pressure and the resulting blanks are treated with oil by the vacuum process. After the shrouds are applied they are then machined in the same way as a

metallic pinion. Some idea of the amount of compression required in the cotton is given in the illustration showing a 165-lb. cotton bale used in making two pinions each a trifle more than 14 in. in diameter.

LOCUST EGGS ARE NOW USED FOR FERTILIZING SOIL 372

Locust eggs are being used to enrich the soil in Sicily and other parts of the Mediterranean country where these insects are very prolific. Tons of the eggs are gathered annually and treated with sulphuric acid and lime, after which the resulting material is used for fertilizing purposes. Experiments have shown it to be especially good as a food for olive trees. The locust is one of the most serious pests encountered in a great part of the Old World. On the island of Cyprus a bounty is paid for the egg cases and at a certain season hundreds of men and women are engaged in searching for them. They are long cylindrical masses enveloped in a glutinous secretion and deposited in holes excavated in the ground by the females. Several thousand tons of the eggs, it is estimated, are laid yearly, during periods when the migrations are heavy, on different islands. As early as 1881 attempts were made to exterminate the pests by searching for and destroying their eggs, and in that year some 1,300 tons of them were collected in Cyprus alone.

DRILL BOAT THAT LIFTS ITSELF OUT OF WATER 180

At the Lake Ontario end of the Welland ship canal, where there is no natural harbor and all work in connection with the new harbor is exposed to the full force of the lake storms, a drill boat that can be raised four or five feet above the waves when required was used in making the rock soundings. The boat consists of twin hulls rigidly connected, over which is laid a platform for the drilling outfit, steam boiler, four hoisting engines, and capstans and crabs required for handling the boat.

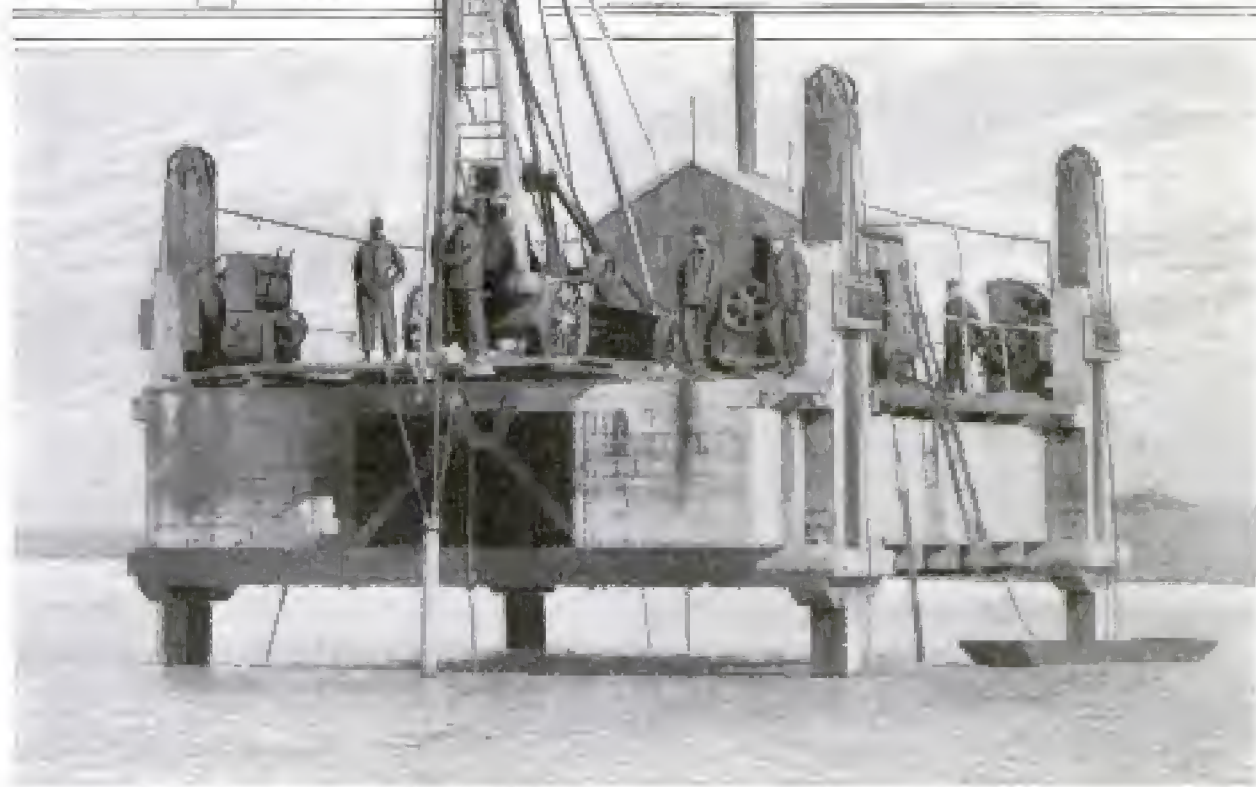
Made by General Electric Company, Schenectady, N. Y.

After inspection to F. H. G. 6/23

U. R. Johnson, P. O. Box 695, Berlin, Ark., Canada

Drill Boat Used in Making the Soundings at the Lake Ontario End of the Welland Ship Canal. Where All Work in Connection with the New Harbor was Exposed to the Full Force of Lake Storms

When Raised above the Waves the Drill Boat Rested on Four Spuds, One Located at Each Corner; the Lifting was Done by a Wire-Rope System Worked by Four 10-Horsepower Steam Crabs



At each corner of the boat is a heavy spud working in guides, and when the boat is to be lifted these spuds are brought to a bearing on the bottom of the lake and the boat is raised by means of a wire-rope system worked by four 10-hp. double steam crabs. The raising rope is led from the top drum of the steam crab over a sheave at the top of the spud, to a sheave on the guide, and

then to an anchorage on the boat. The spuds are kept clear of the lake bottom when the boat is afloat by ropes that pass through sheaves fixed to the bases of the spuds. These ropes are operated by the lower drums of the crabs, the two drums being so adjusted as to keep both ropes taut at all times. This boat has been successfully used for pile driving as well as for drilling.



How the Third Track for the New York Elevated-Railway System is being Built as a Second Story between the Existing Tracks without Interference with Traffic

NOVEL TROUSER PROTECTOR DEvised FOR BICYCLE

To avoid the necessity of wearing trouser guards when riding a bicycle, a North Carolina man has devised a disk protector which is designed to be attached to the right side of the fore sprocket. It is made of metal in about the size of a standard phonograph record. The plate covers the gear and enough of the chain to prevent the bottom or cuff of a trouser leg from becoming entangled or soiled by oil or graphite.

Although somewhat odd in appearance at first sight, the device does not particularly detract from the looks of a cycle on which it is used. It may be readily attached to any ordinary wheel.



REBUILDING NEW YORK'S ELEVATED RAILROADS

In the rebuilding and enlarging of almost the entire elevated-railroad system of New York City a difficult piece of engineering work is being carried out practically without interference with the hundreds of trains that operate daily over the structures. The work is estimated to cost about \$10,000,000 and consists in converting the lines into two-story tracks. The elevated roads were built originally as two-track lines. When it became necessary to provide a third track for express trains it was found that while there was room for the additional track there was not sufficient space for the island express stations. This has made it necessary to build the express tracks above the local tracks, involving, as a general thing, the remodeling of the entire elevated structure. In carrying out this work of construction on the busiest elevated railroad in the world without serious interference with traffic, rapid and well-organized teamwork is required on the part of the men. So adept have the ironworkers become that they can hoist a 10-ton girder from the street, drop it into place, and have

cont. Leatler L. Sargent, 700 -- 9th St., Washington, D.C.

Inventor: Adolphus O. Davis, Wilson, N. Car.

116 Broadway & Lee, New York City

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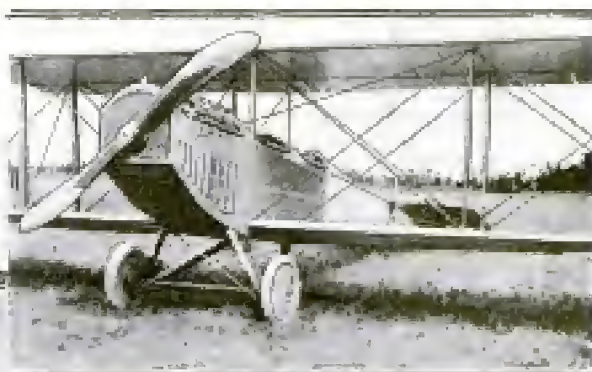
the riveting under way within a space of three minutes. At one point on the Second Avenue line it was necessary to raise the entire structure seven feet. This was accomplished without stopping a single train.

NEW MILITARY AEROPLANES DELIVERED TO ARMY

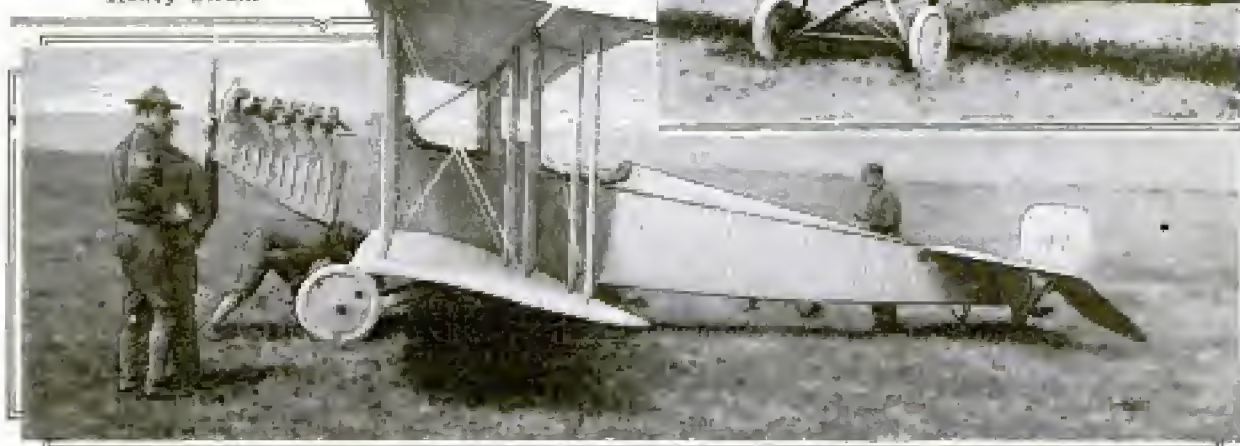
Eight tractors of the new Curtiss military type were recently delivered at the army aeronautic station at San Diego, Cal. This not only represents the largest order for machines that has ever been filled for the government by one designer, but also the largest shipment that has been received at a government aerial station at one time. The new machines are graceful in appearance and have shapely streamline bodies. Each is equipped with a 100-hp. domestic motor rated to give the craft a speed of approximately 70 miles an hour. The wings have a spread of 37 ft. and are braced for heavy work and hard usage. Each machine is designed to carry a pilot and observer and a sufficient store of fuel for a six-hour flight. In the opinion of the war department, as previously expressed, the craft compare throughout very favorably with most of the reconnaissance machines that are now used by various armies in the European war.

PHOTOGRAPH GALLERY RUNS WITHOUT ATTENDANT

For concession purposes at summer amusement parks, and similar places, an automatic camera has been constructed which takes tintype pictures of its customers with the same mechanical precision with which other types of vending machines deal out peanuts and gum after a coin is inserted. The operation of the device is purely mechanical. It is only necessary for the subject to deposit a dime and seat himself before the lens. The apparatus is built on a short platform with the camera placed at one end and a chair and background fixed at the other. By glancing into a finder, the subject assures himself that his posture is becoming and then drops a dime in a slot. As soon as this is done, an arc is illuminated



Aside from Making Good Speed for a Biplane, the Craft is Built to Withstand Heavy Strain



The Side View of the Machine Gives a Good Idea of Its Streamline Effect and the Character of the Rudder and Elevators Used

which throws a strong light over his countenance. Subsequently the shutter opens and closes. In another minute the tintype, fresh from the chemicals and mounted in a circular brass frame, issues through an aperture at one side of the machine. It is then placed on an electric drier for a minute to evaporate the moisture.

CURRENT-MOTOR PUMP MADE FOR IRRIGATING USES

Designed chiefly for irrigating purposes, a current motor has been built

by a Montana inventor which in recent tests has shown itself capable of pumping approximately one cubic foot of water a second to a height of 27 ft. This amount of work is about equal to that of a 3½-hp. gasoline motor. The apparatus is



This Current Motor, Which Operates Practically without Expense, Is Capable of Irrigating About 100 Acres of Land

constructed on a floating platform which is moored in the current of a river. The expense of its operation practically amounts to nothing, while its maintenance consists of merely a low upkeep charge. The amount of water it pumps is sufficient to irrigate about 100 acres of land.

In response to appeals made by the board of agriculture and fisheries, the British army council has agreed to furlough a limited number of new soldiers for a fortnight and permit them to assist in the hay harvest. English farmers have faced a serious problem because of the dearth of labor, and this means is being taken to cope with the situation. Agriculturists who wish to employ soldiers in this capacity make their applications to the board-of-trade labor exchanges, which forward the requests to the military authorities. It is only when suitable labor cannot be otherwise obtained in a specific locality that soldiers are supplied for this purpose. It is also stipulated that each soldier shall be paid \$1 a day for his services, if he provides his own board and lodging.

GOVERNMENT WARNS AGAINST "HALF AND HALF" COTTON

A warning against the so-called "half and half" cotton has been issued by the United States Department

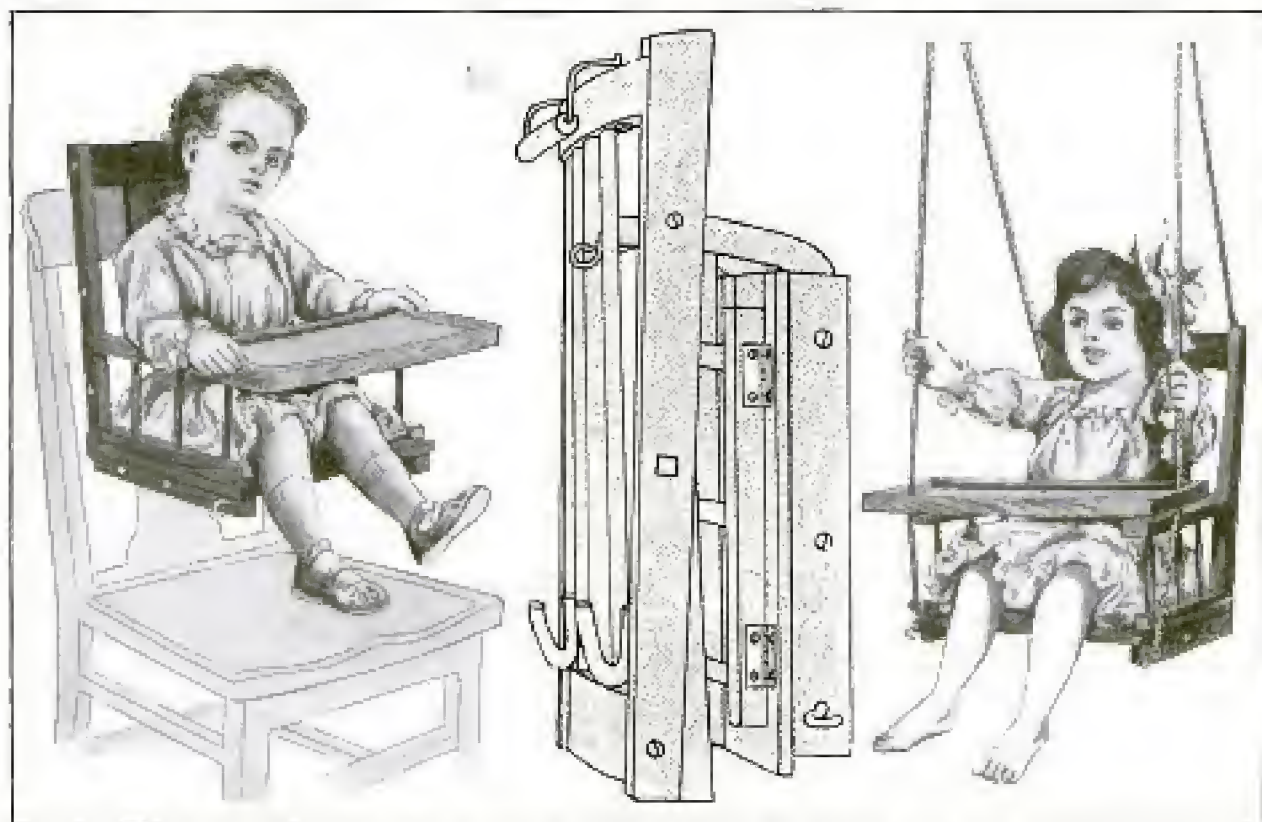
of Agriculture, being particularly directed to the cotton growers of Oklahoma, Texas, and Arkansas, where much of this cotton is being grown as a result of an active campaign carried on in the past two or three years. Tests made by the de-

partment show that "half and half" cotton does not maintain a high yield of lint per acre, and that the lint is of poor quality, irregular, and very short. Much of the lint examined was found to be less than ⅞ in. in length, which is the minimum length acceptable under contracts for future delivery.

Information Sheet
 Dept. of Agriculture

Conf: H. H. Liscum, Sec. Sept 1912-13
 Lyle R. Bellings Journal
 Lyle R. Bellings Mont.
 Ref: T. A. E.
 Jas. H. Martin (Inventor)
 Springfield, Mo.

Combination Swing & High Chair Co.,
Box 423,
POPULAR MECHANICS La Porte, 577 Ind.



When the Chair is Not Needed It may be Folded and Stored in a Small Space

**CHILD'S HIGH CHAIR BUILT
TO SERVE ALSO AS SWING**

Several convenient points are embodied in a child's combination swing and high chair which has lately been brought out. Besides serving two different functions, the device has the added advantage of being collapsible. It is fitted with rubber-covered grips which enable it to be fastened to the back of an ordinary dining chair and used as a high chair at a table. Places for fastening ropes are also provided so that in a few minutes' time it may be converted into a swing suitable for use on a porch or lawn, or within doors if desired. The plate tray remains in place in both instances and serves to hold the child safely in the chair.

¶ Much of the sand used in the construction of the new subways in New York is beach sand obtained practically free of charge from the holds of ships which, owing to war conditions, have made the western trip across the Atlantic carrying only sand ballast.

**ANTISEPTIC BATHS GIVEN
STEERS ON RANCHES**

On well-regulated stock ranches facilities are usually provided for bathing the cattle in germicide periodically in order to kill disease-bearing vermin. One of the ways of doing this is to



Bathing Steers Is a Regular Operation on This Wyoming Ranch

Cord: W. A. Du Buy, Claremont, Va.
On Ranch of C. H. Wattles, Claremont, Va.
Wyo.

build a deep, rectangular tank between two corrals. When this is filled with an effective solution the steers are driven into it at one end and made to swim to the pen at the other extremity. On such occasions attendants alongside push the animals' heads beneath the water so that all parts of their bodies, including the insides of their ears, are reached by the germicide.

DEEP UNDERGROUND CAVERN IS OPENED BY MINERS

While sinking a shaft for a gold mine in southern Nevada, some 11 miles from the famous Tonopah camp, a vast subterranean cavern was uncovered recently in a most unexpected manner. The claim is a new one. At 50 ft. below the surface the drills passed into a soft-rock formation which caused the workers to express surprise. After the last blast had been fired the muckers were lowered down the shaft until the end of the derrick rope was reached. It was then found that the

explosion had uncovered a great pit extending far into the earth. The blast had made the shaft bottomless.

Subsequent examinations of the place were made, but although men were lowered for a distance of several hundred feet they were unable to reach the bottom. Rocks which became dislodged, slipped into the chasm and fell through space silently, giving back no echoes. The atmosphere in the cavern appears to be pure. A candle will burn freely in it, but the flame occasionally flickers, which indicates that some place there are openings through which the air is able to circulate.

The surface of the rock bears evidence of having been burned. This is responsible, partly, for the theory that the miners have broken into a cross fissure caused by the shrinkage of the earth following the cooling of a volcano. Tests of the incrustment on the walls are reported to have shown that it is almost pure carbonate of lime, indicating that the volcanic rock formation overlies lime beds.

STEEL BUILDING ERECTED IN SEVEN HOURS

Record time was made recently by a Syracuse, N. Y., contractor in erecting

it was expedient that all possible haste be exercised in raising a new building.

The material for the structure was on the ground at eight o'clock on the morning the work commenced. At 4:15 o'clock that afternoon, after an hour had been allowed for the workers to lunch, the building was completed and turned over to its owners.

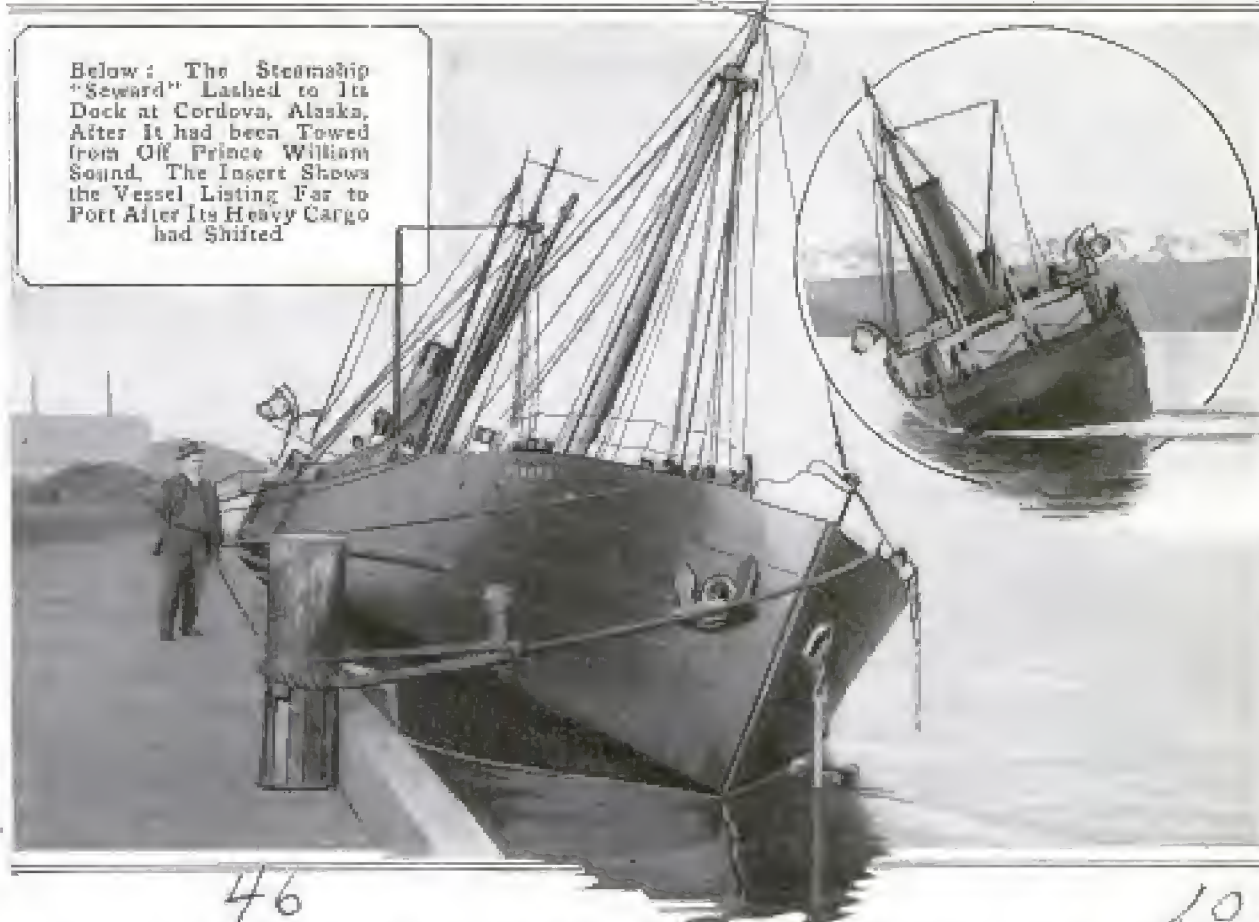


This Photograph was Taken at 8:15 in the Morning, a Quarter of an Hour After the Work had been Started



Here the Building is Shown as It Appeared Exactly Four Hours Later, When 32 Men Were at Work

Below: The Steamship "Seward" Lashed to Its Dock at Cordova, Alaska, After It had been Towed from Off Prince William Sound. The Insert Shows the Vessel Listing Far to Port After Its Heavy Cargo had Shifted



46

104

VESEL LISTS FAR TO PORT WHEN CARGO SHIFTS

While steaming off Prince William Sound recently with a 4,000-ton cargo of copper ore, the freighter "Seward," bound from Cordova, Alaska, to Tacoma, Wash., suddenly listed nearly 30° to port and became unmanageable. The trouble was caused by a shifting of the heavy cargo. There was no opportunity for remedying the condition at sea and immediate assistance was needed to save the vessel from capsizing. An "S O S" call brought another vessel to the scene which towed the disabled steamer back to the Alaskan port, where a part of its cargo was transferred to a second ship. It is believed that had the accident happened farther out at sea the "Seward" would have gone to the bottom.

With German and Austrian toys shut out as a result of the war, American toy makers are finding a growing market for their wares in the countries of the Orient.

ELECTRIC BUS IN SERVICE AT BATHING BEACH

One of the curious vehicles in service at Ocean Park, Cal., is an electric bus with which sight-seers are transported from point to point along the beach. Power is supplied by a storage battery and the bus operates on the



Electric Bus Used for Transporting Sight-Seeers from Point to Point along the Beach at Ocean Park, California

concrete sidewalk that parallels the beach. The length of the run made the bus is a trifle more than a mile.

Cord: A. A. S. vs. Cordova, Alaska.

Cord: Alan D. Wuthenbury 5424 East Tenth Park.

Chesapeake, Md.

REVOLVING NAIL BIN MADE WITH MANY COMPARTMENTS

To facilitate the handling of nails and bolts in retail hardware stores, a sectional bin has been devised which has



The Bin Is Particularly Convenient because Its Capacity Allows It to Hold a Large Assortment of Nails and Bolts.

a number of convenient features for the dealer. It is made in different sizes, the largest of which has five sections and 50 separate compartments, each holding more than 50 lb. of nails. The sections are conical in shape, made of metal, divided by substantial partitions, and provided with scalloped edges to prevent the contents from spilling. These members are placed one above the other on a vertical shafting and are mounted on ball bearings so that they may be revolved easily. Suspended from a rotary arm mounted at the top of the center tubing are scales.

¶ Largely as a result of the awakening in shipping circles brought about in this country by the European war, there are now building in American shipyards over 48 seagoing steamers, 23 tank ships, nine colliers, and a considerable number of smaller craft.

MOST NORTHERLY RAILWAY IS NOW ELECTRIFIED

In connection with the prospective building of a government railway in Alaska, it is of interest to note the results which have been gained by the electrification of a section of the Swedish State Railways which is used for the transportation of iron ore. The road is the most northerly line in the world, starting at a point nearly 87 miles north of the polar circle. It is used to carry ore mined near Kiruna to the Norwegian frontier. The power station is 155 miles distant from the terminus of the branch. A single-phase current of 80,000 volts is carried by overhead transmission lines to substations along the way. It is claimed that this system of operation has increased the train capacity of the line 40 per cent and the speed 50 per cent over steam operation.

LARGE MUNICIPAL STADIUM BUILT IN CANON

What is undoubtedly the finest municipal stadium in this country has recently been completed at San Diego, Cal. It is beautifully situated in a natural cañon in full view of the bay, which is approximately a mile distant.

Twenty-five tiers of concrete seats, which furnish accommodations for approximately 30,000 persons, encircle a tablelike athletic field, 621 ft. in length and 287 ft. broad, which is skirted by a quarter-mile track. The top row of seats is 39 ft. above the arena and is margined by a broad walk from which access is given to the several entrances. The ground at this point is level and extends, back for some distance, providing ample parking space for hundreds of motor cars and giving their occupants an excellent view of the field.

Closing the front end of the amphitheater, without obstructing the sight of the ocean or cutting off the cool breeze from it, is a long colonnade of massive pillars forming a heavy portico in front of which extends a semicircu-

The Eclipse Manufacturing Co., Wellston, Ohio



General View
 of Athletic
 Field. Far in
 Background Is
 the Ocean



Front of
 Amphitheater
 and Hills
 between Which
 It is Built



lar structure, the graceful lines of which give the approach to the stadium a most pleasing appearance. In the court thus formed is a space for basketball, tennis, and handball courts, while the room available in the structure itself is occupied by dressing rooms and lockers for the participants in athletic meets.

In dedicating the stadium recently a nine-hour program consisting of infantry and cavalry drills, football, baseball, and basketball games, track events, and field contests was held.

A book containing 100 coupons, each good for an hour's free repairing or overhauling, is being issued to the purchaser of each car by an automobile company in Detroit, Mich.



Above Is One
 of the Several
 Artistic Ticket
 Offices Such as
 Are Located at
 Various Points
 about the
 Broad Walk.
 Steps Below
 Lead from Side
 of Colonnade
 to the Seats



YOUNG WOMEN ARE ENGAGED AS AMBULANCE SURGEONS

Two young women graduates of an eastern medical college were recently



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placed on the staff of ambulance surgeons at a New York hospital. The district in which they operate is one of the poorest in the city and likewise one where emergency calls are more or less continuous. Since in work of this kind it is not always possible to determine in advance just what conditions will be encountered on a call, the girls are handling a hard branch of work and one which in nearly all cities is taken care of solely by men.

NEW FEDERAL ROAD ASSURED TO YOSEMITE PARK

Projection of a new road extending from western Nevada to the Yosemite National Park has been undertaken by the government. Purchase was made some time ago, by popular subscription, of the Tioga road, long ago abandoned, which reached from the eastern slope of the Sierra Nevada range through the park. In turn it was presented to the government and accepted. It is now announced that this will be rebuilt.

ARTESIAN WATER ASSURED FOR OGDEN, UTAH

Sixteen artesian wells with an aggregate flow of about 9,000,000 gallons of pure water daily, have been drilled in the Ogden Valley adjacent to Huntsville, and will hereafter supply Ogden, Utah. The depths from which the water is taken vary from 110 to 147 feet. A pipe line had previously been laid through the Ogden cañon for the purpose of tapping some of the near-by mountain streams, and it will only be necessary to make an extension to this in order to carry the water into the city. The wells have been sunk within a radius of less than 250 feet of each other, and as new

bores have been made the flow of the old ones has not been decreased. The entire work, including the property purchased by the city, when completed will have cost less than \$150,000, it is believed.

FELDSPAR OFFERS STORE OF POTASH SALT

By employing a new chemical process which is now being tried, it is believed that potash can be obtained from feldspar economically enough to make production of the salt commercially possible at normal prices. Five parts of powdered feldspar are mixed with one part of powdered quicklime and treated with a solution of calcium chloride. The latter acts with the lime to the formation of an oxychloride cement which binds the powder in lumps. These are fed into a kiln, where, under high temperature, the potassium is freed from its union with the silica and unites with chlorine. The muriate thus formed is soluble in water and by a

Paper by E.W. Coggeshall
before National Lime Assoc.

International News Service.
238 William St.
N.Y.C.

Cont: E. 13
Ogden, Utah.

"Engineering News"
6/3/15

"Engineering News"
6/17/15

leaching process a 10-per-cent solution of potassium chloride is said to be obtained.

— 4250

TAILINGS STACKER USED IN THE WITWATERSRAND

About 25,000,000 tons of gold ore is hoisted out of the mines of the Witwatersrand in South Africa every year, and the disposal of the tailings, as the refuse rock is called after it has been crushed to a sand and the gold extracted by the cyanide-of-potassium process, constitutes one of the biggest problems in the operation of some of the mines. As a general thing gold mines are located in mountainous country, and the tailings can be dumped in almost any quantity down a mountain side, but in the Witwatersrand the country is flat and special methods must be used to prevent the mine and mill from being buried. In the type of tailings conveyor and stacker most commonly used, an inclined steel structure, supported on steel towers, carries a cableway equipped with buckets with which the tailings are carried and dumped in a pile at some distance from the mill. The pile eventually grows to enormous size, and most of the steel structure is buried and lost. These tailings piles are a striking feature of the Witwatersrand, but a great nuisance as well, as in the dry season the wind carries the sand over the whole countryside, unless the pile is covered with some such substance as salt, which absorbs enough moisture to prevent the material from being blown away. In some cases the problem is solved by running the tailings back into worked-out portions of the mine.

TRACTION ENGINE USED TO WARM STIFFENED OIL

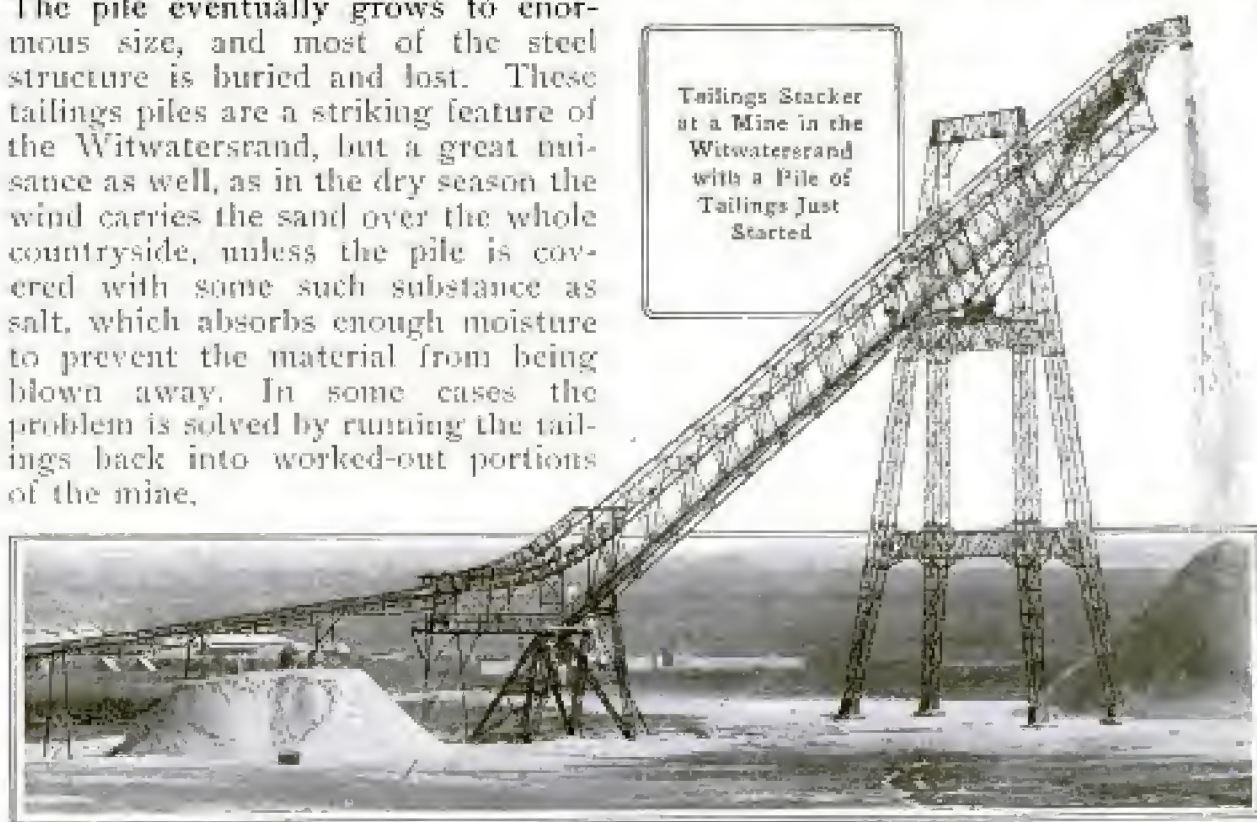
When the crude oil in a tank car received at a Canadian city in midwinter could not be made to flow on account of the stiffening effect of the



Traction Engine Used for Warming Crude Oil That had been Stiffened by the Cold

intense cold it was easily thawed and softened by steam supplied from an ordinary traction engine. The whistle of the engine was removed and in its place an iron pipe was inserted. This was connected by an intermediate pipe with a pipe projecting from the side of the car and leading into the tank. Steam was then raised in the traction

Tailings Stacker at a Mine in the Witwatersrand with a Pile of Tailings Just Started



Ray Dymond.

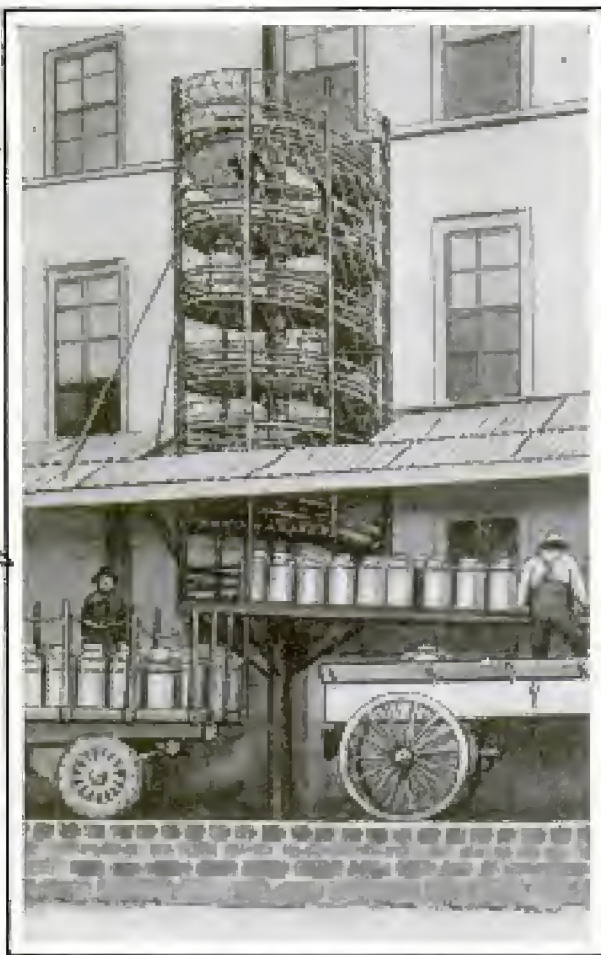
Box 129, Durban, Nat. Canada.

Cont: A.L. Kellogg, Grantwood, N.J.

engine and as soon as the pressure had reached the required degree the valve in the projecting pipe was opened and the steam was allowed to enter the tank. This process was kept up until all the oil had been softened and drawn from the tank.

9900
**SPIRAL-SLIDE CONVEYOR
USED IN CREAMERY**

At a creamery establishment in Los Angeles, a spiral chute is employed for conveying empty milk cans from the



This Shows How the Cans Are Shot from the Spiral onto a Second Chute Which, When Inclined, Allows Them to Slide into a Wagon

third floor of the building to a loading platform near the ground. The device has been constructed in order to effect a time saving in handling the receptacles. The chute, on which the cans slide in an upright position to the wagons waiting below, is inclosed in a wire netting so that it may easily be cleaned and is subjected to the sun's rays during a certain period each day.

**LAW STOPS REPRODUCTION
OF EXPOSITION MEDALS**

According to recent advices from Washington the photographing or reproducing of medals and diplomas awarded to exhibitors at the Panama-Pacific Exposition is prohibited. This situation arises from the fact that the work on them was done in Federal mints and by the Department of Engraving and Printing, which thus brings them under the statutes prohibiting the reproduction of United States coins and securities. Congressional action is necessary before the medals can be legally photographed.

**POWER LOOM MADE TO
WEAVE ORIENTAL RUGS**

After many failures in the attempt to develop a machine capable of weaving oriental rugs, a successful power loom for this purpose has at last been constructed. It is able to produce a rug in a single day which would require a year's labor on a hand loom. As for the rug itself, it is claimed the work is so ingeniously done that close scrutiny by even an expert is required to distinguish between it and one made by hand.

One of the principal differences between oriental and domestic rugs is that in the former the short pieces of yarn forming the pile are knotted to the warp threads, instead of merely being looped around them. It is partly this which makes the oriental rug both more expensive and durable than common ones. To build a machine which could successfully tie this knot has in the past been the chief obstacle confronted by inventors, for in making the knot a hand weaver uses five different finger motions. The knots tied by the new machine, however, of which there are more than a million in a large-sized rug, are said to be exactly the same, so far as appearance is concerned, as the real Persian, or Sehna, knot.

With this loom it is possible to produce very durable and artistic rugs much more reasonably than they can

Wasc was personally directed by the late Nazam Coatesman and carried

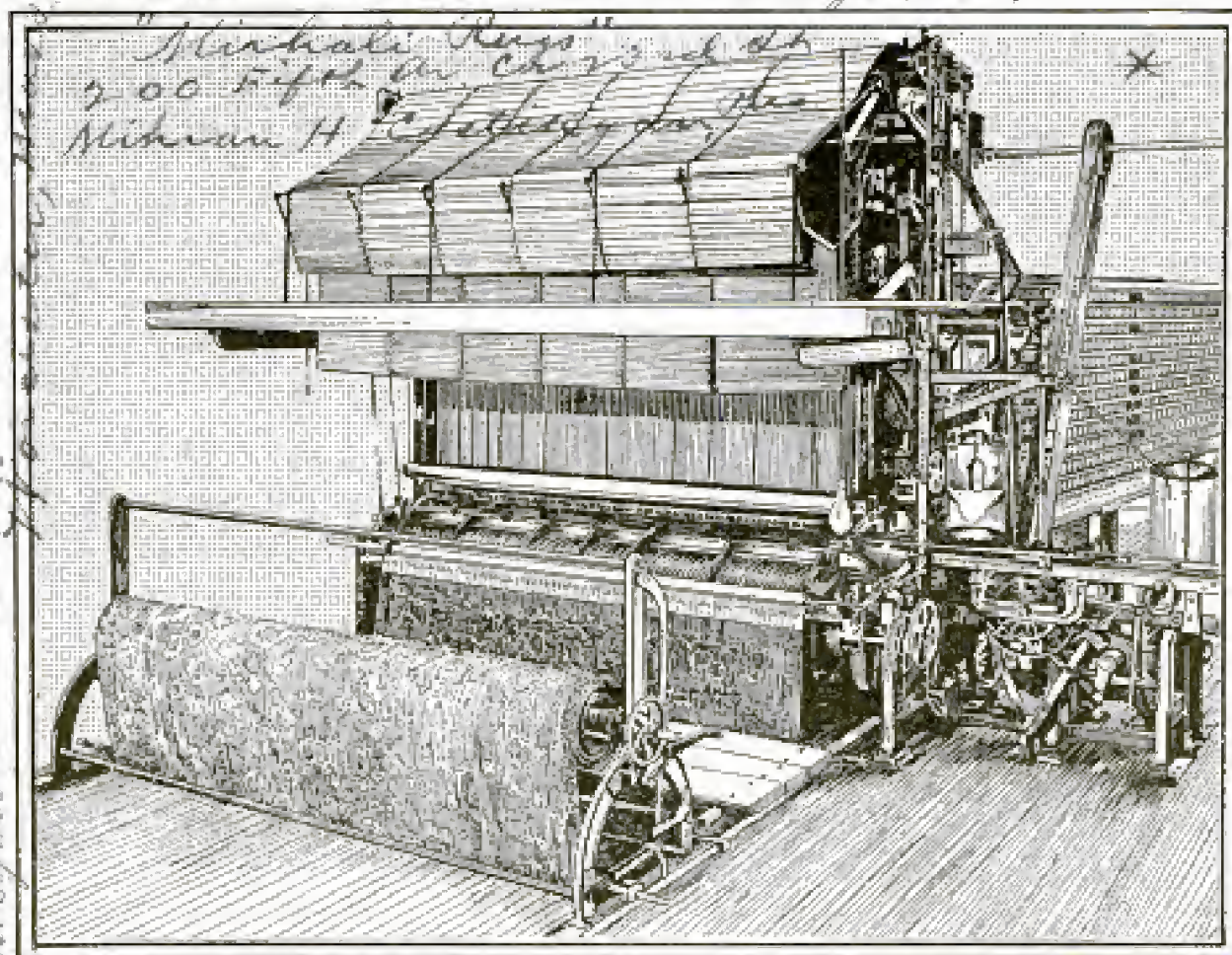
*Albert Warple,
322 Boynton St., Tropico, Calif.*

Geo. F. Worts, 627 W. 113 St., New York City.

POPULAR MECHANICS

585

United States Persian Carpet Co. *



Rugs Which from the Point of Workmanship can Hardly be Told from Those of Oriental Weaving, are Made on This Power Loom

be imported. An additional advantage, from the consumer's point of view, is that the machine-made rugs are fresh and new and therefore more lasting than many of the popular-grade hand-made rugs.

Only one man is required in operating the power loom. The wool is introduced at the rear of the machine and guided by Jacquard cards in which the design is cut. Long rods controlling the various yarn feeders drop into the perforations and actuate a mechanism which knots the wool to the warp threads. Any pattern may be woven in this way and as many duplicates made as are desired.

Insanity patients at an Illinois institution are to play golf. A nine-hole course is being laid out for their use. The experiment is based on the belief that moderate outdoor exercise in many instances is a very valuable means of strengthening unbalanced minds.

**AUTOMATIC SIGNAL SYSTEM
FOR STREET CARS**

9956

At St. Louis a new signaling system for motormen has been tried out on surface-traction cars provided with inclosed vestibules at the back, which not only makes rear-step accidents next to impossible, but also lessens the work of conductors and allows them to direct more of their attention to collecting fares and issuing transfers. A small electric lamp is mounted in the forward vestibule in front of the motorman where it is readily seen by him. The wiring is arranged so that the light is automatically extinguished when the conductor closes the rear doors. Until these are entirely closed, however, the light continues burning. This relieves the conductor of the necessity of pulling a bell rope and also makes it impossible for a signal to be given prematurely, providing the doors are not opened after once being closed.

Paper N. 21 with
United Railway's Bulletin
St. Louis
Mo

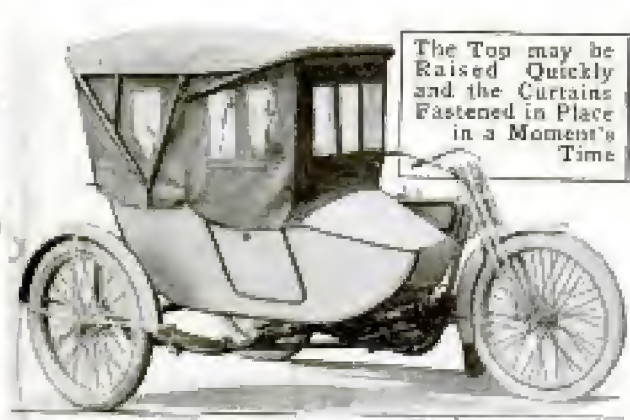
James K. Dalkarian
K. H. Dalkarian & Sons,
2214 Broadway, New York
Oriental Rugs

Financial backing: Coating, Co. 130th St. New York City
Looms embodying this invention have been constructed by
Groompton & Knowles Loom Works
Haverhill, Mass.

Copyrighted material

**MOTORCYCLE SIDECAR FIXED
 FOR STORMY WEATHER**

To make the sidecar attachment of a motorcycle serviceable in disagreeable weather, a neatly fitted top with water-tight curtains has made its appearance.



The drops are provided with mica windows and fasten snugly about the body. When caught in a storm, or when facing cold winter winds, the sidecar passenger is as well protected as if occupying a well-appointed motor car.

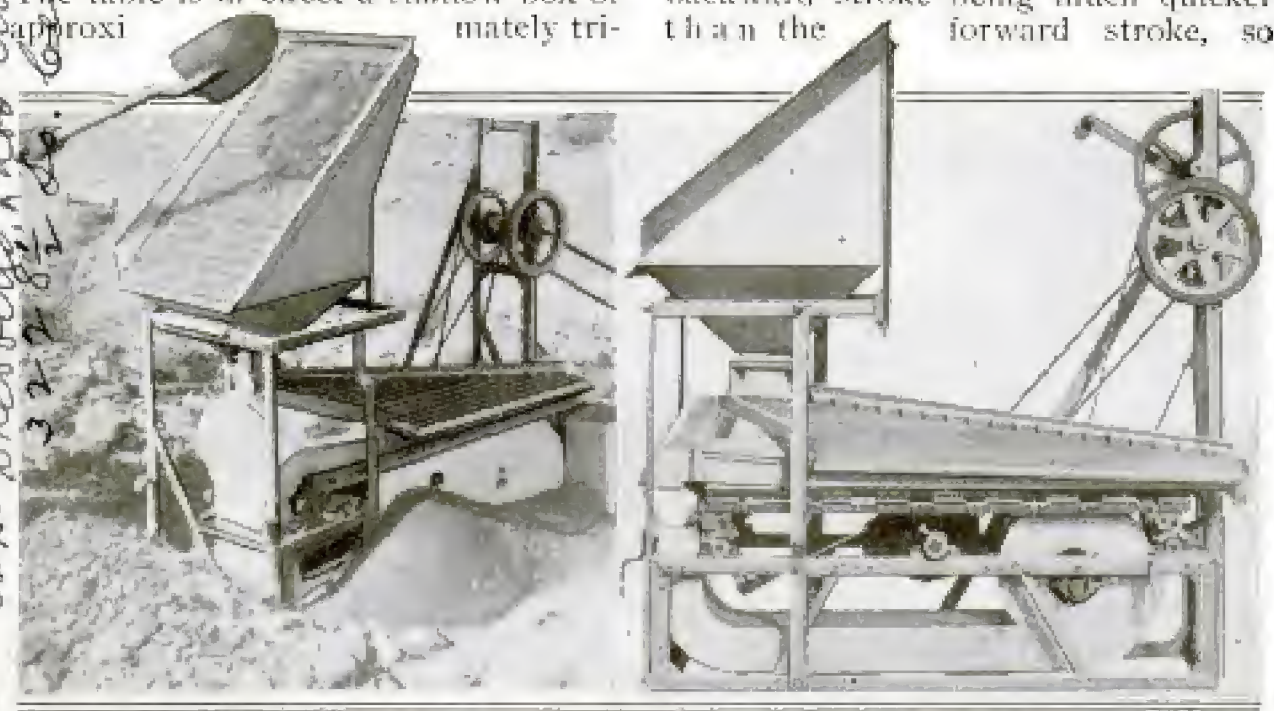
**SANITARY PAPER BIBS MADE
 FOR SMALL CHILDREN**

Intended for the use of babies and young children, a paper bib has been introduced which may be thrown away after once being soiled. It is neat and crisp in appearance and replaces the usual linen napkin. The face of the bib is absorbent and the back waterproof. It is inexpensive and serves to lessen the size of a family washing.

NEW PLACER MACHINE WORKS WITHOUT WATER

A machine for concentrating the gold and valuable sulphides without the use of water is now being introduced in some of the placer mines of the West. This machine consists of a table top, on which the actual work of separation is done, together with such auxiliary parts as a screen, pressure fan, and machinery for oscillating the table. The table is in effect a shallow box of approximately tri-

angular shape, with a slight slope lengthwise toward the point and a sharp slope sideways. The surface is formed with a series of grooves running longitudinally of the table, each about 1/4 in. in depth and width, and equipped with small perforations along the sides. A toggle mechanism gives the table a reciprocating motion, the backward stroke being much quicker than the forward stroke, so



Placer-Working Machine That Uses Air Instead of Water in Separating the Valuable and Worthless Materials

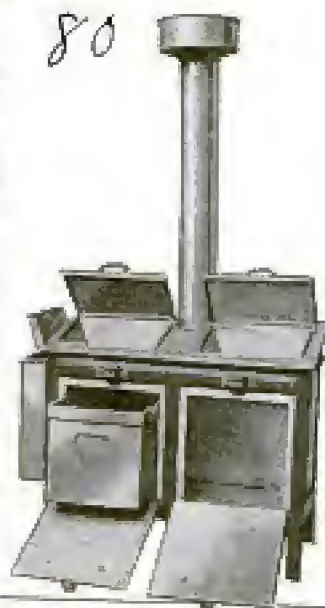
191
 Inventor: W. H. Stebbins, 325 W. 178 St., N.Y.C.
 Herbert A. McGraw, 825 W. 178 St., N.Y.C.
 Published for the Inventor by McGraw-Hill, 325 W. 178 St., N.Y.C.

7. S. Crane, Publisher.

that any bit of material held in the grooves is gradually moved toward the point. Mounted above the table is a hopper, and above this is an inclined screen. The material is cast onto this screen, which removes the larger stones and prevents them from reaching the table, while the smaller material falls through the screen and hopper to the table. Here it spreads out and as the table is oscillated the lighter and worthless portions are shaken off over the side while the heavy portions such as gold and sulphide settle into the grooves and are gradually shaken to the end and deposited in a receptacle. This action is assisted by the fan, which forces air under light pressure through the perforations into the mass of material and keeps it in a loose condition.

THREE-COMPARTMENT RUBBISH CAN

Intended especially for use in cities where the health ordinances prohibit the mixing of garbage and ashes and necessitate the maintenance of separate disposal receptacles, a three-compartment, ventilated rubbish container for household purposes has been designed by a Cincinnati inventor. It is made throughout of metal and is not at all unlike a camp stove so far as appearances are concerned. The refuse is held in metal boxes which fit into the compartments. Separate covers on the top of the device allow the deposit of the waste materials, while side doors are provided for the removal of the cans. A small box built on one side offers a place for disposing of waste paper.



ODD SIGNAL WARNS TRAFFIC OF LOWERED ARCS

As a means of safeguarding against accidents occurring when street arcs are lowered at intersections, a lighting company at Minneapolis uses portable signal standards to warn drivers and lessen chances of collisions. One of these devices consists of a light, substantial tripod supporting an upright rod which carries two signal flags set at right angles to each other. These, like the rest of the contrivance, are made of metal. Each bears a large red spot on a white ground, enabling it to be seen for some distance. When an inspector wishes to clean or insert fresh carbons in a lamp, he places the signal in the street at the point where the arc will hang when lowered.



RAPID READING IS TAUGHT 15 BY SIMPLE MACHINE

For the purpose of assisting persons who read slowly to cultivate the habit of assimilating the contents of a printed page or column with greater rapidity than is their custom, a Boston professor of psychology has developed an interesting machine which schools one in the proper way of reading. It is of simple construction, and in experiments has been found to produce good results.

Near the top of a reading board is an oblong slot which is only wide enough to display one line of printed matter to the reader. A newspaper clipping of single-column measure is inserted at the back of the board and engaged between two rollers, which draw it up-

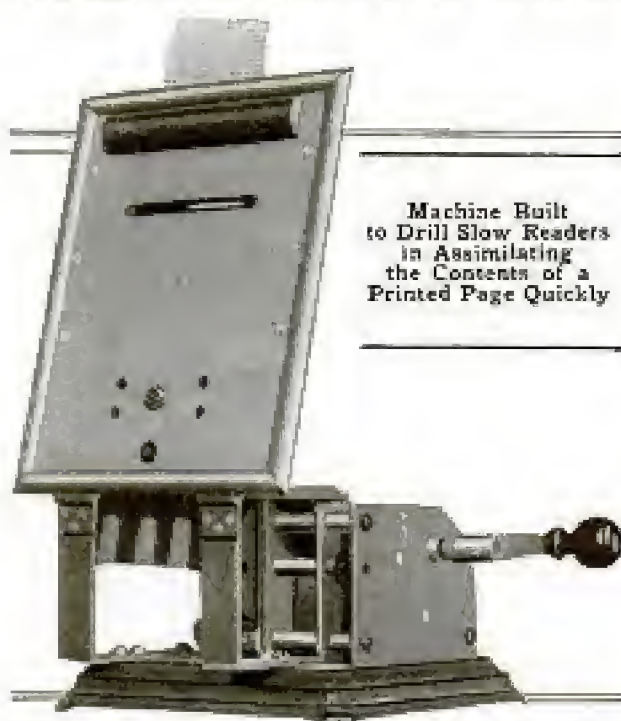
Designed & used by
Prof. of Psychology at the
Boston Normal School
Calvin A. Scott.

Made by Minneapolis General Electric Co.

James H. Hylger,
314 Jewett St., Boston, Mass.

Conv. Alex. J. Koch,
Healy Ave., Wondale,
Cincinnati, Ohio.

ward one line at a time as a crank, fixed in the base, is turned. By means of an auxiliary device, only one-half of a line is shown at a time. A metal



Machine Built
to Drill Slow Readers
in Assimilating
the Contents of a
Printed Page Quickly

piece covers first one side and then the other of the opening, exposing the first words of a line for a fraction of a second and then veiling them while the other part is uncovered.

A person with normal eyesight and mental faculties should be able to read approximately 300 words of light matter a minute. A great many persons do not read thus rapidly, however, because they have acquired a habit of pausing and looking back at words instead of moving their eyes only once in scanning a line. It has been shown that a slow reader gains from 50 to 100 words a minute after practicing with the machine.

210 ELECTRIC-LIGHT BULB USED AS PHONOGRAPH NEEDLE

Quite an ingenious, although a somewhat ludicrous, substitute for a phonograph needle was discovered recently by a number of bluejackets at the United States naval station at Guantanamo Bay, Cuba. A group of the sailors had ordered a talking machine from the States. When it arrived they were chagrined. There was an abund-

Ralph W. Larson, U.S.S. Recd's.
Naval Station.

Guantanamo Bay, ~~Chile~~

ance of records but not a needle to be found. They were bemoaning their plight when a sailor climbed on deck carrying a number of electric-light bulbs. Out of curiosity he started the phonograph and pressed the tip of one of the lamps against a record. The sound of a popular song rang out clearly. For days the machine was played in this way.

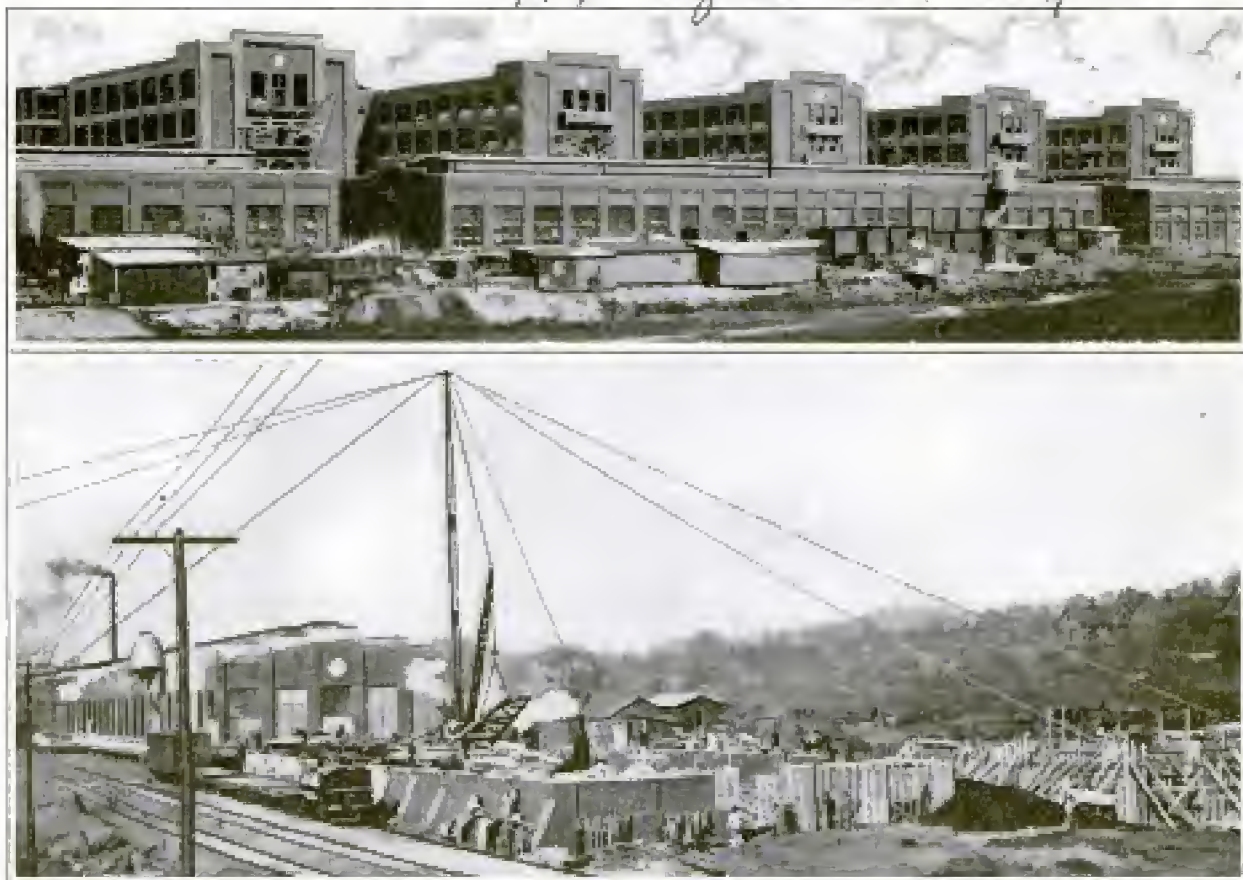
LARGE STEEL TACKLE CASE FOR LONG FISHING TRIPS

Providing ample space for carrying all the accessories required on an extended expedition, a steel tackle box has been brought out for fishermen which is built in a convenient form. It is designed especially for sportsmen who desire to carry a full equipage and keep it assembled in one case. It is slightly more than 24 in. in length, 9 in. high, and 6 in. wide, and affords adequate room for a number of disjointed poles of standard size. The bottom space is sufficiently roomy to accommodate landing nets, gaff hooks, hats, a raincoat, a flask, bottled bait, and similar things. The box is fitted with two metal trays, each of which is divided into small compartments. The upper of these receives small flies, leaders,



The Case is Made with Double Seams Electrically Welded and Reinforced

wobblers, and wooden minnows, while the lower one provides space for tackle, various sizes of reels, large minnows, and other equipment.



Large Arms and Ammunition Plant at Bridgeport, Connecticut, Where Scores of Buildings Are Still in the Course of Construction.

GREAT WAR-MUNITION PLANT IN COURSE OF ERECTION

280 Europe's unprecedented demands for munitions of war have caused the hurried construction of a number of large ammunition and arms plants in the East, and the enlargement of others. One of these is at Bridgeport, Conn., where scores of factory buildings have been erected by one corporation on a site embracing some 102 acres of land. Substantial structures, already completed, if placed end to end would stretch a number of miles in length. These have been built since the opening of hostilities abroad. Much attention has been directed at this plant of late because of the recent outbreak of labor trouble there, concurrent with attempts to wreck the Capitol at Washington and destroy vessels sailing for Great Britain. The disturbances, which were attributed to the activities of German agents, for a period threatened to seriously cripple operations at the factory by tying up construction work.

RUBBER PAVEMENT IN USE IN LONDON STREET 9853

Rubber is being experimented with at London as a surfacing material for pavements, and aside from providing a perfectly noiseless, resilient, and non-skidding roadway it appears to possess good wearing qualities. A stretch of this pavement has been in use in the Old Kent Road for nearly a year and has been subjected to a traffic that amounts to approximately 90 tons to the square foot each hour in every twenty-four. It is built up with wood blocks finished with a cushion surface of rubber that is secured firmly in place by dovetailing. So far the roadway bears no noticeable indication of wear or injury, it is said, while a wood-block pavement adjacent to it, which has been subjected to a like traffic during the same period, has lost $\frac{1}{2}$ in. in thickness. The use of rubber in this capacity is purely experimental, and whatever merit it may have remains to be proved.

Rubber Growers Association
1 Oxford Court, Cannon St., London E.C.

A. Bonnin, Secy.
Metropolitan Board of Works, London, Eng.

"The Rubber World"
The Rubber World
The Rubber World
The Rubber World

Cowt: J. E. Houlihan, Albert Lea, Merin.

Sale by: ⁵⁹⁰ Albert Lea Gas Light Co, Albert Lea, Merin.
POPULAR MECHANICS

FUEL TANK FAR REMOVED FROM GASOLINE STOVE

Because of well-defined fears, many persons have an inherent aversion to danger. In an attempt to engineer around this recognized feeling and thereby open a larger commercial field for stoves of this kind, an inventor has developed a gasoline range which receives its fuel under pressure through a small, hollow copper wire, allowing the gas tank to be kept as far from the stove as may be desired by any user. It has essentially the appearance of a gas range and eliminates the common objection of having a gasoline tank supported above, or adjacent to, its burners. Because of the



The Gasoline Tank may be Kept a Hundred Feet from a House if so Desired

the use of gasoline stoves, and suffer inconvenience rather than subject themselves to what they consider to be

small size of the feed wire it would be almost impossible for more than a teaspoonful of gasoline to be in the stove.

184

DELIVERY VEHICLE BUILT FOR MOTOR-CAR BODIES

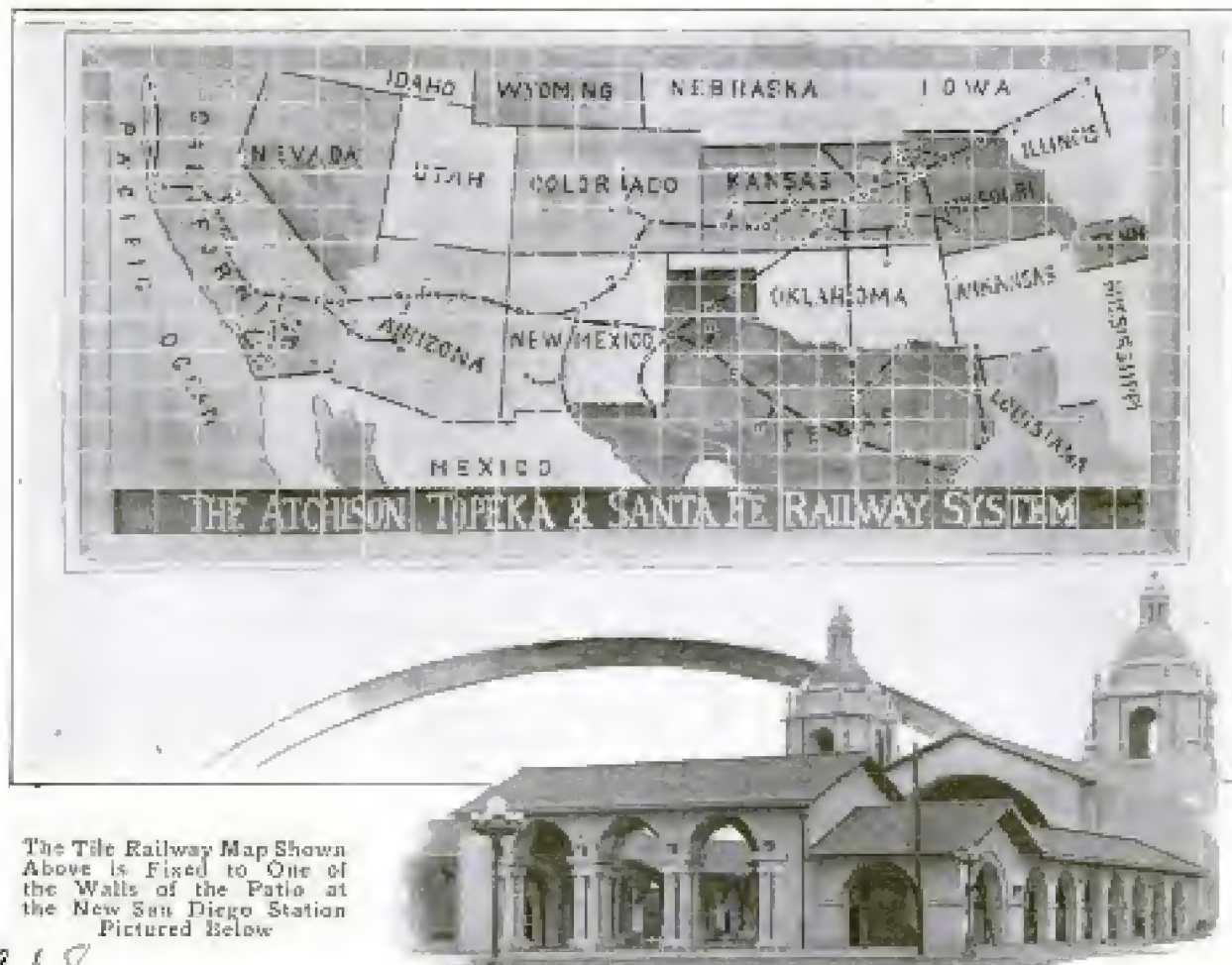
Fisher Body Co., Detroit, Mich.
For delivering motor-car bodies to assembling plants, a Detroit manufacturing company has developed a truck and trailer for its own use which is divided into 10 open-end compartments. Two touring or roadster bodies can be carried in double-decked compartments back of the driver's seat on the truck, while similar spaces are provided for eight others on the trailer. The upper-deck flooring is built in sections and secured to angle irons bolted to the sides of the partitions.

This arrangement makes it possible to remove the upper shelvings and furnish adequate space for limousine bodies. Sufficient room is allowed between the truck and its trailer to permit the driver to make as sharp turns as may be necessary.

CA recently patented watch crystal, said to be unbreakable, consists of a disk made of celluloid or other elastic transparent material, and sprung into an undercut groove in the watch bezel.

By Removing the Upper Shelvings, Sufficient Space is Provided in the Compartments for Limousine Bodies





The Tile Railway Map Shown Above is Fixed to One of the Walls of the Patio at the New San Diego Station Pictured Below

9968

RAILWAY SYSTEM IS SHOWN ON LARGE TILE MAP

On one of the court walls of the Santa Fe Railway station at San Diego, Cal., is a colored map made of tile which shows the various lines of the system. It is approximately 14 ft. by 7 ft. in size and is composed of some 360 separate pieces of specially designed tile. The various states from Lake Michigan west to the Pacific coast which are traversed by the railway are outlined in colors and the points representing their principal cities marked with small incandescent bulbs which are illuminated at night. The station, which was lately completed, is of Spanish colonial architecture and finished in plaster. One of the features of this structure is its patio, 150 ft. in depth, which is surrounded by heavy columns and provided with a massive, triple-arch entrance. The court forms an airing place for travelers waiting for trains.

LOADED MOVING VAN TOWED BY MOTORCYCLES 9490

As a means of demonstrating the pulling power of their engines, two motorcycles were recently harnessed together and made to perform quite a striking feat at Bridgeport, Conn. The



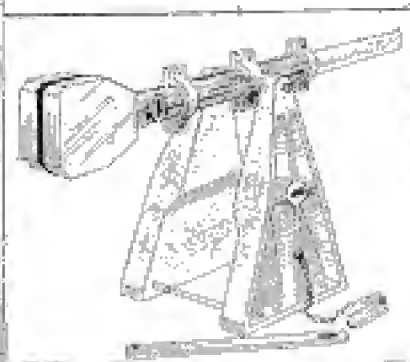
Sixty-Two Men Packed the Wagon, Which was Drawn 28 Miles

James A. Burroughs,
866 State St.,
Bridgeport, Conn.

machines were placed side by side and joined by three pieces of steel shafting. They were then hitched to a 2,600-lb. moving van in which 62 men were crowded. With this heavy load to pull, the motorcycles were driven a distance of 28 miles. Both of the cycles were stock machines and accomplished the task with ease.

COUNTERBALANCED POLE NEEDS NO STEEPLEJACK

Built so that it may be easily lowered when repairing or painting is required, a flagstaff for buildings has been designed which may be used either in a vertical or horizontal position, as occasion dictates. The pole is pivotally mounted between two heavy uprights which form its support, and is counterbalanced by weights at the base. The supporting brackets are mounted on steel beams placed at a height which brings the axis of the staff level with the top of the fire wall of a building. This enables the pole to be used horizontally. When work is to be done on it, the pole is swung backward. It is made both of steel and wood, and in sizes up to 50 feet.



The Pole is Held Securely in a Vertical Position by a Locking Bar That Passes through It and the Standards

RETRACING RAILWAY PLANS IS FOUND UNNECESSARY

In attempting to escape the expense of making new tracings of maps and plans to be filed with the valuation division of the Interstate Commerce Commission, railway companies have found a quick means of doing the work and complying with the demands which they vigorously protested against more than a year ago. A blueprint is made on special paper from an original drawing to be reproduced. This is then placed, face down, on a smooth gelatin surface with the result that the material immediately beneath the tracing lines is affected and caused to rise. When the blueprint is removed an ink roller is passed over the gelatin, inking the fine raised lines, but not touching the rest of the surface. A piece of tracing cloth is then pressed lightly on this mat. When removed, the impression on the cloth is an exact duplicate of the original tracing.

CONTRACT FOR STATE ROAD GIVEN TO MUNICIPALITY

The town of Southampton, L. I., has appeared in the rôle of a road builder. It has been awarded a \$113,000 contract for the construction of a state highway between its limits and Quogue. The situation is an interesting one, but is not without precedent. The municipal corporation placed its bid for the work in competition with private contracting companies, setting the lowest figure, and winning. One of the reasons that led the city to undertake the project is that the work will provide employment for many of its unengaged laborers. Southampton also controls some of the best gravel beds in that vicinity.

Announcement has been made by the Federal Horticultural Board that an attempt will be made this winter to inspect and certify Christmas "greens" cut in districts infested by the gypsy moth, so as to allow shipments of clean stock to be made.

232

8543

NO SERIOUS MENACE SEEN IN IMPORT OF BEEF

During the last 15 years the beef-export trade of Argentina has made a remarkable development. An investigation of that country's meat production, especially from the standpoint of its effect upon the domestic industry, has recently been completed by the Department of Agriculture. The conclusion reached by the Federal men is that the rapid advance of the republic's beef-shipping business has been brought about by the sharp decline in the surplus production in this country. Although approximately 154,000,000 pounds of meat, of which 140,000,000 lb. was refrigerated beef, was imported from Argentina during the year ended Sept. 1, 1914, the Bureau of Animal Industry does not consider that native producers need fear the effect of this competition for some time to come. On the other hand, it is believed that there will be a beneficial effect arising from a demand for breeding animals. At the present time Argentina ranks next to Australia in the number of sheep, and fourth in cattle.

HANDY SPOOL HOLDER FOR CROCHETING 6476

A handy little device for holding the spool of floss or cotton while doing

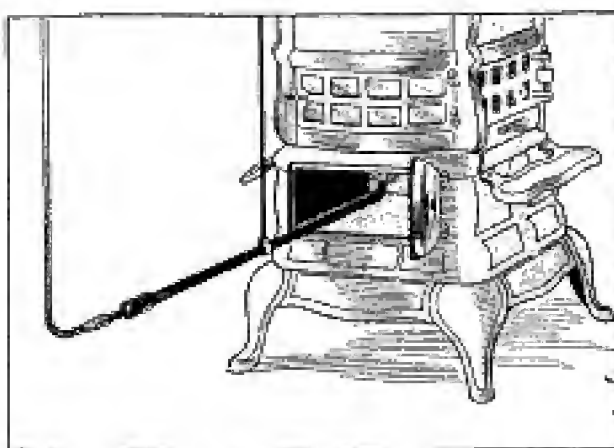


crochet work, recently brought out in France, consists of a small metal disk with a central loop of wire attached by a swivel hook to a bracelet. The wire loop opens easily to pass through the hole

in the core of the ball of thread, the disk keeping the ball from slipping off. Thus the ball is always safe, and close to hand, while it interferes in no wise with the freedom of the hand or arm.

FIRE-LIGHTING DEVICE MADE FOR COAL STOVES

Designed to be used in stoves, furnaces, and other heating apparatus, a fire-kindling device has been invented



Gas Torch Which Starts a Furnace Fire Quickly without the Use of Kindling

which eliminates much of the trouble of rebuilding a fire which has burned out during the night. The lighter is arranged much on the style of a gas torch. It consists of a pipe of convenient length, at one end of which is a gas burner and at the other end a nipple to which a rubber hose may be connected. When it is desired to start a fire or prevent one from dying out this burner is lighted and the torch placed beneath the furnace grate in such a position that the gas flame comes in contact with the coal and ignites it. During the spring and early summer when a light fire is needed for a couple of hours each morning to take the chill out of the rooms of a house, several bricks may be placed in the fire bowl of a furnace and gas heat used exclusively.

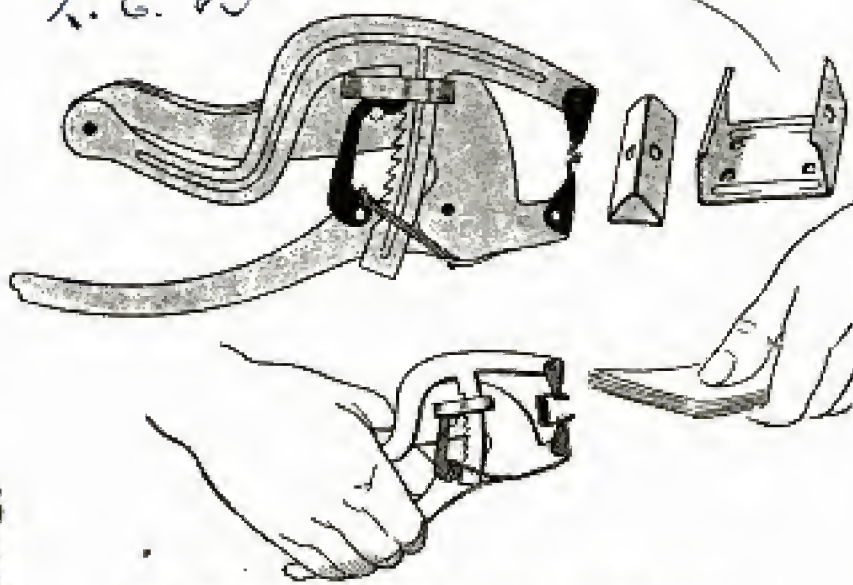
BINDER CLIPS FOR FILING PAPERS AND PAMPHLETS

For securely binding loose papers, a series of pamphlets, or similar things preparatory to filing them, a steel spring clasp has been invented, which, once set in place, maintains a firm grip on whatever it holds. For heavy service such as binding several volumes of a magazine, the grip is made U-shaped

J. M. Buckelew, (Inventor & Manufacturer)
1611 Benton Blvd.
Kansas City, Mo.

8205

with a broad mouth, while for clasping letters, papers, or clippings, it is triangular. The jaws are drawn apart with specially designed pliers which operate by a ratchet action. On the flat side, or back, of the binder are "L. E. B."

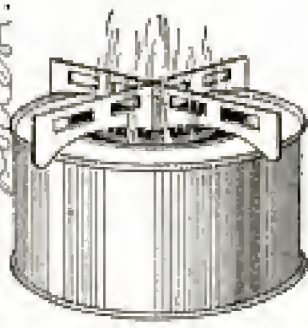


Steel Binders and the Pliers Used in Opening Them

small clamps for the insertion of an index card. Once in place, the grip can only be removed by using the pliers.

9074 —
ODORLESS PORTABLE STOVE FOR CAMPING PURPOSES

Designed particularly for the use of motor tourists and campers, a small portable stove has been brought out in France which may be carried very conveniently and without any danger of injuring, through the leakage of oil or odors, anything which may be packed with it.



The fuel, which is in the form of a paste of solidified alcohol, is contained in a cylindrical box that forms the base of the stove. When ignited the material burns with an intense heat, but is neither explosive nor productive of strong odors. When the flame is extinguished the paste again solidifies.

for sale by quincaillerie of
 Georges Heuserot
 39 rue de Clignancourt
 "4 all dealers" Paris

COAST-SURVEY EQUIPMENT TO BE INCREASED

For new vessels to be used by the Coast and Geodetic Survey in charting the coasts of the United States, Alaska, the Philippines, Hawaii, Guam, and Porto Rico, the secretary of commerce has asked for an appropriation of \$500,000. The importance of the work is shown by the fact that a wire-drag party organized on the Atlantic coast in 1906 has, in the succeeding eight years, found 3,300 rocks with less water over them than was shown on the navigation charts, and that 393 of these were distinct menaces to navigation. On a 41-mile stretch

in Alaskan waters, 14 uncharted pinnacle rocks were found by the same method. In the last 11 years, 30 wrecks, with a loss of 61 lives and \$2,000,000 worth of property, have occurred on the Alaskan coast alone on account of the badly charted waters.

CAMPAIGN TO LESSEN LOSS IN HANDLING EGGS

In an effort to reduce the tremendous annual loss of eggs due to needless breakage, and other causes, the Department of Agriculture recently equipped an egg and poultry demonstration car and sent it through the Southwest, inaugurating an educational campaign aimed at farmers, retailers, and shippers. Representatives of the Bureau of Chemistry undertook to show simple ways in which material savings might be effected by the exercise of care and intelligence.

In addition to demonstrating the proper methods of refrigeration, candling, handling, packing, and transporting of eggs, special effort was made to induce farmers to candle and grade

Francis P. Mann - 12 Boulevard Arago, Paris, France.
 mfr. française des Produits "Capi"
 adèol., (Herault) France

"Marine Journal"

187

Informa- taken from book issued U.S. agric. Dep.

"Motor Age"

C. F. Harwood, Boston, Mass

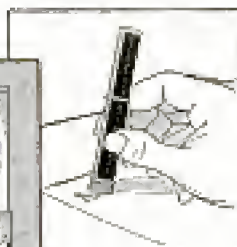
POPULAR MECHANICS \$2.50

595

eggs before going to market, and then dispose of them according to their quality, rather than in bulk at a set price. The difference in the keeping qualities of fertile and infertile eggs was another point emphasized. The advantage of gathering eggs immediately after they are laid and storing them in cold places was also demonstrated.

7540
**NEW INK ERASER USES
PREPARED FIBER**

In a new ink eraser that has just made its appearance on the market the work of removing the ink is done by a compact bundle of prepared fibers carried in an aluminum holder. The holder is so made that the fibers are easily fed down as required by wear, or other conditions. The eraser is designed to be used for ink of any kind, and if rightly employed will not seriously mar the finish of paper.



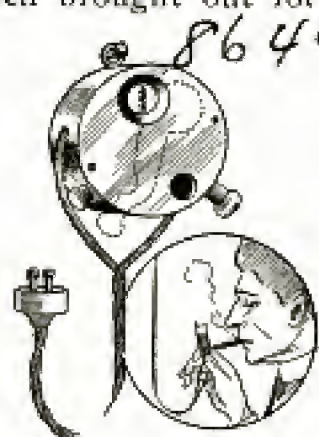
8425
**COLLAPSIBLE STOVEPIPE
FOR CAMPING TENT**

Intended for use in tents, a collapsible stovepipe has been devised which may be folded into a compact space and carried by campers without inconvenience. It is composed of a series of telescoping sections which nest one within the other when the pipe is not in service. One of these segments is provided with an insulating jacket to protect the canvas, through which it passes, from excessive heat. This same member is also supplied with a fastening device by means of which the pipe may be secured to the tent pole or some other fixed object adjacent to the roof of the tent.



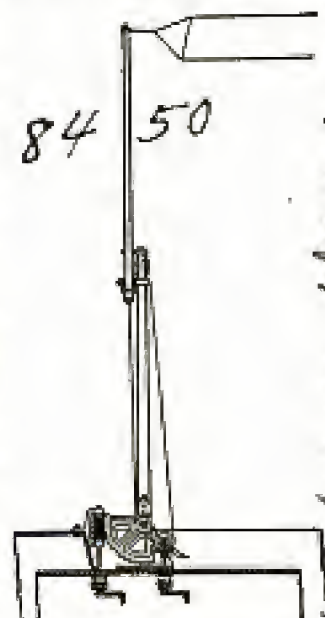
**CIGAR LIGHTER AND CUTTER
FOR AUTOMOBILES**

A combined electric cigar lighter and cutter has been brought out for use on motor cars. The cutter is operated by a button that projects from the side of the case, and the act of pressing this button turns on the current and sets the lighter going. When the button is released the current is automatically turned off.

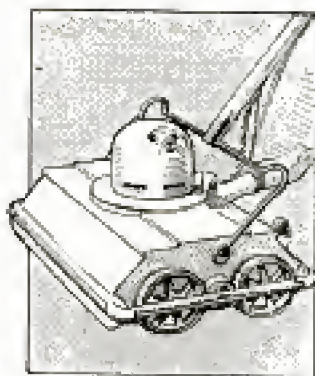


**EXTENSIBLE WIRELESS MAST
FOR SUBMARINES**

An extensible mast for wireless operation that may be folded down on the deck so that it does not interfere with the operation of the vessel when submerged has been brought out by a German company for use on submarines. The mast consists of two parts, the upper part being made to slide on the lower part. The upper part is raised or lowered by means of lines running over pulleys, as shown, and operated by a crank arm within the submarine. The lower part of the mast is carried on bearings and may be raised to a vertical position or laid flat on the deck by means of a worm gear which meshes with a quadrant fixed to the base of the mast, and which is also operated by a crank arm within the submarine.



NOVEL AND PRACTICAL THINGS FOR THE HOME



Vacuum Attachment for
Carpet Sweeper

is intended to be attached to an ordinary carpet sweeper. Twelve-inch nozzles are fitted in front and back of the rotary brush, the motor is mounted on



Convenient Book Rest
for an Armchair

Designed particularly for use in a private library, a neat metal book rest is being made which may be fastened to an arm of a chair and adjusted to whatever angle best suits a reader. The



Electric Flatiron with
Headlight

a new electric flatiron is a 4-cp. lamp fitted with a small reflector which throws light directly onto the board. The chief convenience of this is obvious. Aside from the major function, however, the lamp serves as a pilot light and is especially serviceable when used

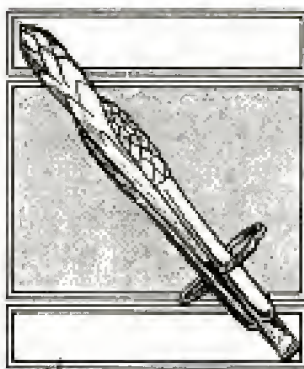
²⁸⁶
OPERATED by a compactly housed electric motor, an ingenious vacuum-cleaning device has been invented which

top of the sweeper, and a dust bag is secured to the handle. By making the installation, a vacuum sweeper capable of removing both dust and lint from a carpet or rug is provided at moderate cost.

Supported by a bracket is also pivoted to the clamp so that the rack may be turned freely. Mounted on the fore bracket of the handle on

in a room having only one outlet, or socket.

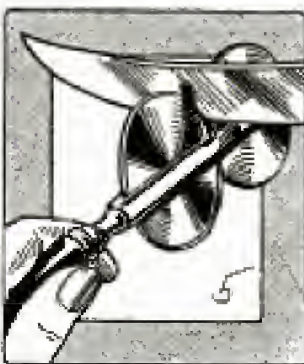
To prevent the soiling of one's fingers when asparagus is eaten, a holder has



Neatly Designed Asparagus
Holder

been designed which need not arouse a person's self-consciousness when it is used. Three rings attached to folding prongs allow for the insertion of the thumb and two forefingers of the right hand.

For sharpening carving knives, when it is necessary, at a table, and doing the work both

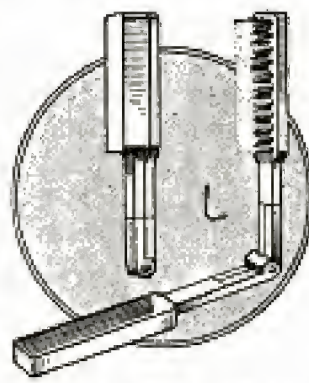


Sharpening Device for
Carving Knives

quickly and satisfactorily, a convenient device has been introduced to take the place of the ordinary "steel," which a novice often experiences difficulty in using. It is provided with a pair of beveled steel wheels be-

tween which a knife blade is drawn once or twice.

Intended for travelers, a toothbrush with a folding handle is so designed that the bristles are incased when not in use. The end of the handle is enlarged and hollowed, enabling it to fit securely over the brush when folded down.

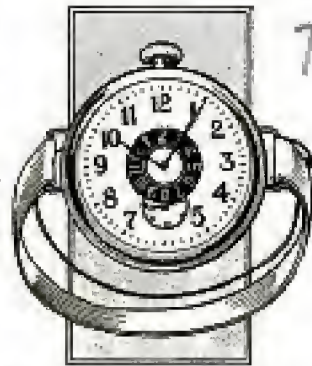


Folding Toothbrush for
Use of Tourists

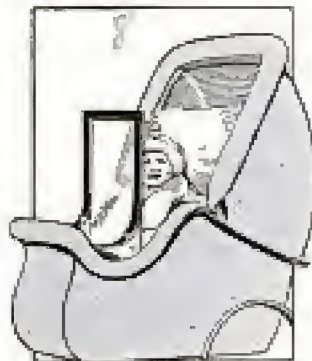
Designed as a silent alarm, suitable for use by deaf persons, a wrist watch which is capable of awakening a person without disturbing the other occupants of a house, has been introduced. It has concentric dials, the inner of which is used for setting the alarm. A small-sized cord that encircles the wrist or ankle, when the watch is strapped in place, tightens at a predetermined time and awakens the sleeper. The device performs an especially convenient function when traveling.

To protect a baby from rain, dust, and chill breezes, a wind-shield has been designed for use on perambulators. It is made of celluloid and is held in position by detachable upright pieces. When these are removed the shield may be rolled and tied neatly at the front of the carriage.

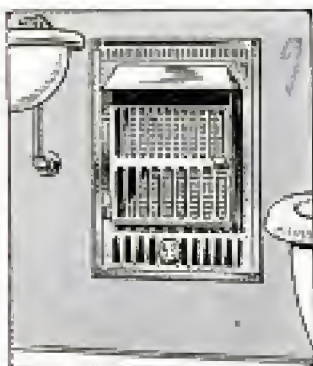
Serving either as an auxiliary heater for spring



Wrist Watch That Serves as Alarm Clock



Windshield Protects Baby from Exposure



Gas Heater for Bathroom Purposes

or fall use, or as a permanent one, a gas wall radiator is made which is serviceable in a bathroom. It is set approximately a foot and a half above the floor and has the appearance of being a hot-air register. It has a corrugated copper reflector and a deflector which radiate the heat and give

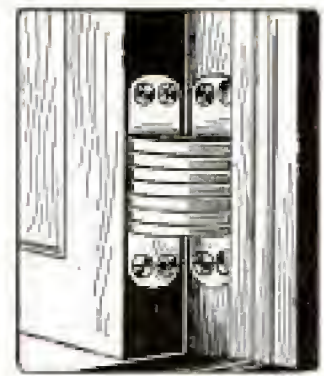
a pleasing lighting effect.

Invisible door hinges have been invented. They are made up of a number of leaves, mounted on friction bearings, which move in or out of a door and casing as the former is opened or closed. It is only when a door is open that the hinges can be seen.

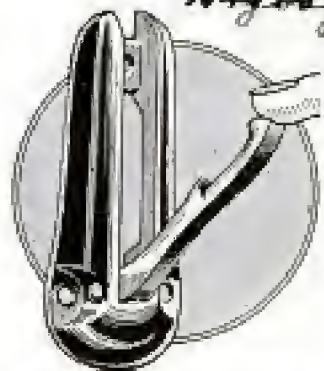
A spring hook for hats and coats is made which remains flush with the wall when not in service. The chief advantage of the device is that it may be used in places where ordinary hooks are unsightly. When an article is removed, the hook rises to a vertical position of its own accord.

Patent rights have been allowed an eastern inventor who has devised an adjustable muzzle for dogs. It is made so that in a moment's time it may be fitted to the face of an animal. Most muzzles are rigid and made after one set pattern, which frequently means that a dog is forced to wear an ill-fitting contrivance which is a source of constant irritation.

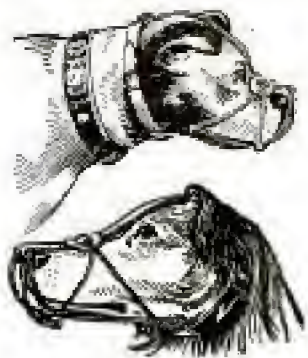
Business interests have appealed to the postmaster-general of Great Britain urging penny postage with France, Belgium, and other allied nations.



Hinges Are Invisible When Door is Closed



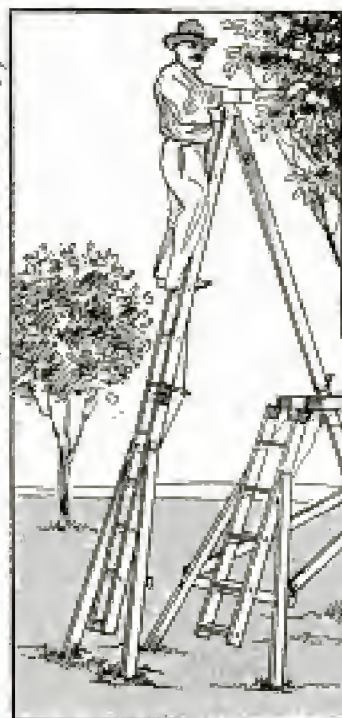
Sightly Hook for Coats and Hats



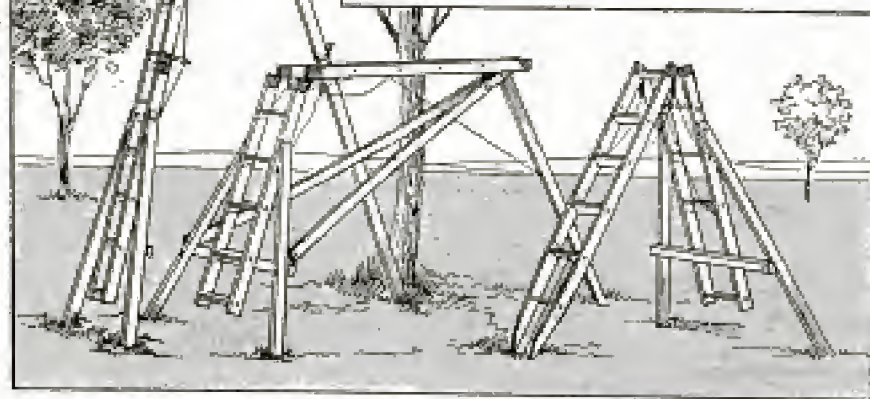
This Muzzle may be Adjusted to Fit Any Dog

FOLDING ORCHARD LADDER FORMS STAGING

A combination ladder, stepladder, and scaffolding has been invented which is intended particularly to be



used in orchards for fruit picking. When a staging is wanted, the device may be extended in such a manner that a platform 6 ft. in



This Shows Three Different Ways in Which the Ladder may be Extended and Used

length is provided at a height of 6 ft. from the ground. When it is necessary to reach the top of a tree, a simple adjustment provides a 12-ft. ladder. When not in use, or when being transported, the apparatus folds so that it is 6 ft. long, 14 in. wide and 9 in. deep.

MID-OCEAN SUNSET IS SEEN ON NIGHT AERIAL FLIGHT

In a recent night flight over San Francisco, an airman climbed to an altitude of approximately 6,000 ft. in a biplane and witnessed a mid-Pacific sunset in the vicinity of the Hawaiian Islands. At 8:45 o'clock he lifted from the ground and made the climb in about 15 minutes, reaching the vantage point an hour and a half after the sun had set at San Francisco. He clearly saw the sun dropping low across the sea, while California, below him, was in darkness.

The feat, although a most interesting one, was in no way contrary to what was to be expected. The sun travels at a rate of one-fourth of one degree a minute. In 1 hour and 30 minutes this would amount to 22.5° . Honolulu, roughly speaking, is 28° west of San Francisco, which gives an idea of the position

at which the sun was setting when the airman saw it. From a height of one mile it would be possible for a person to see a Honolulu sunset from the Pacific Coast, although in this instance it was not yet twilight in the Hawaiian group.

PROCESS FOR DETECTING FORGED PRINTS

For detecting forgeries of engravings and other prints, a new process has been invented and patented that makes it possible to detect the slightest deviations of a suspected print from one known to be genuine. In carrying out this process a transparency of the genuine print is made by a photographic process on a reduced scale, and from this a second transparency, approximately the size of the original, is made. This transparency is a positive, the light and dark lines and spaces corresponding to the light

and dark lines and spaces of the original. A small transparency on the same scale as the first one made of



When the Negative Transparency of the Suspected Print is Projected on the Positive of the Genuine Print, the Entire Area will Appear to Be Black Only in Case the Suspected Print Is Genuine

Taken from Patents Office Specifications

Inventor: H. M. Pilkington,
Arden, L.I., N.Y.

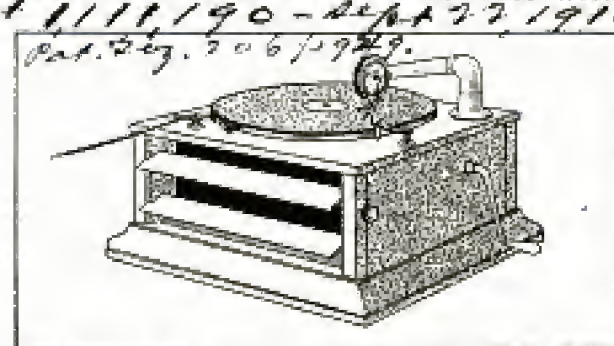
Copyrighted material

Mfr: Wenatchee Woodworking Mill, Wenatchee, Wash.

Cred: Arch Macdonald, 280 Ave St. Oakland, Calif.

the genuine print is made of the suspected print, but this transparency is made as a negative. With the camera carefully adjusted for the correct enlargement, this transparency is then projected on the large transparency of the genuine print. If the suspected print is genuine, the dark lines and spaces of the projected image will exactly fill the light lines and spaces of the transparency, with the result that the entire transparency will appear to be black. If there is any variation between the two, as is almost certain to be the case even though the suspected print has been made by a photographic process, the two images will fail to fit at some points, and at these points the light will shine through. Owing to the unavoidable variations in lenses it is essential that the same lens be used throughout the process.

cabinet and extends over the edge of the record, supporting the needle so that it does not come in contact with

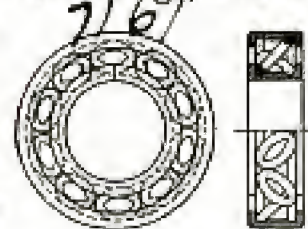


By Means of a Simple Attachment This Phonograph is Used as a Burglar Alarm

the disk. On the circumference of the turntable is screwed a small metal knob, while a string attached to the releasing lever is extended to the door or window which it is wished to guard. By raising the window, for instance, the string is pulled, releasing the turntable and allowing it to revolve. As it turns once around, the small projecting member on its rim strikes a trigger bar on the arm supporting the needle and knocks it to one side, allowing the needle to drop onto the record. A special record that will shout a warning such as "Help! Burglars!" should be used. While arousing a household it will also frighten away the prowler.

FLEXIBLE-RING BEARINGS INTRODUCED IN FRANCE

Rings, or tores, have been introduced by a French inventor to replace balls in bearings, and are claimed by him to



embody several points which give his plan an advantage over the other. The flexibility of the rings, he asserts,

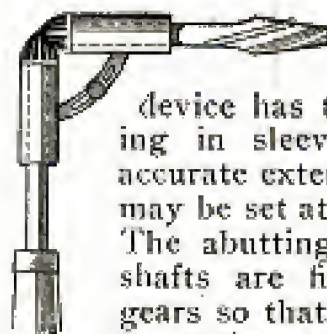
eliminates trouble in case slightly different diameters are used together, which in the instance of balls would cause wear on the larger ones and immediately increase friction. It is also possible to arrange the rings so that they have an initial tension and become to some extent shock-absorbing.

TALKING MACHINE UTILIZED AS BURGLAR ALARM

By constructing a simple attachment which when fitted to a phonograph allows it to be started automatically, a Chicago inventor has devised a means of employing a talking machine as a burglar alarm. A horizontal arm is pivoted to the top of the

SCREWDRIVER ATTACHMENT FOR DIFFICULT WORK

A screwdriver attachment which has recently been invented is designed to be used in close places where it is difficult to employ



the ordinary type of tool. The

device has two shafts, operating in sleeves provided with accurate extensions so that they may be set at any angle desired. The abutting ends of the two shafts are fitted with beveled gears so that by turning one of them the other is also rotated.

One of these members is shaped to receive certain types of screwdriver handles, while the opposite end of the other shaft terminates in a screw-engaging bit.

Cont: H. Ray Martin, 513 -- 8 St., N. E., Washington.

Inventor: J. T. Muldrow, 320 W. Palmetto St.,
Florence, S. Car.

Societe des Etalonnements, La Technique Moderne, Paris, France.

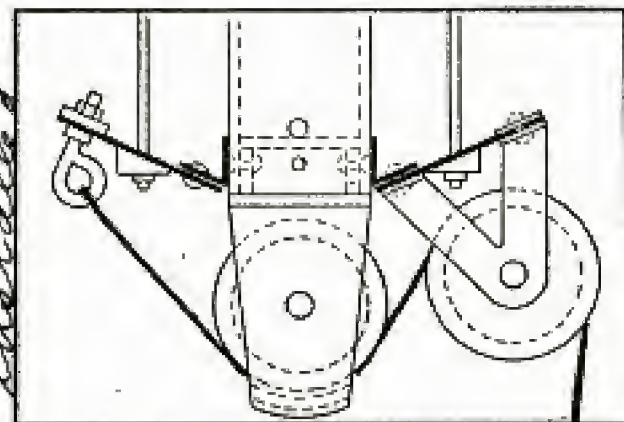
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FLAGPOLE MOUNTING LOWERS POLE FOR REPAIRS

The 40-ft. flagpole surmounting the fire-escape tower of a new hotel in New York City has been made so that



The Flagpole Slides. Vertically in Two Steel Spiders and is Raised or Lowered by the Cable

it can be lowered into a hollow core at the top of the tower, making any part easily accessible from the roof and avoiding dependence on steeple jacks when the pole is to be painted or repaired. The pole is made up of sections of heavy cast-iron pipe and slides in two framed steel spiders, one of which is fixed in the roof framing, and the other a sufficient distance below to give the pole rigidity when it is raised. It is handled by a $\frac{1}{2}$ -in. cable that is attached to an eyebolt in one side of the spider, passes under a

sheave at the bottom of the pole, then over a sheave in the opposite side of the spider, and drops down within reach of the stairway below. When in raised position, the pole is held securely by a 1-in. pin that passes through the pole and bears against the sides of the opening in the lower spider.

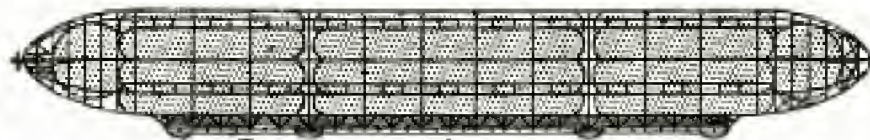
LIGHTHOUSE IS PLANNED FOR NAVASSA ISLAND

Specifications have been completed by the Department of Commerce preparatory to the construction of a lighthouse on Navassa Island, a small, barren rock in the Windward Passage between Haiti and Jamaica in the West Indies. The point is owned by the government and the establishment of a light station there has been requested by navigators for some time, particularly those who ship through the Panama Canal. A tall, cylindrical tower is to be built of reinforced concrete on ground 250 ft. above sea level. The illuminating apparatus will consist of two four-sided lenses mounted parallel with each other on a mercury float and provided with lamps giving an aggregate of 56,000 cp. The focal plane of the lantern will be 402 ft. above the water and its range approximately 31 miles.

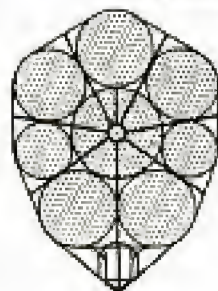
"Technische Monatshefte" April 1914 NEW CONSTRUCTION FOR DIRIGIBLES

A dirigible airship of a new type is made up of series of elongated bal-

loonets arranged in line from the forward end to the stern, and in addition to these, there is a spherical ballonnet occupying the tapered space at each end of the craft. The framework, like that of a Zeppelin, is made of light trellised metal work.



This Airship is Made Up of Elongated Ballonets Running Longitudinally of the Craft and Arranged Radially around a Central Cylindrical Framework



loonets running longitudinally of the craft and arranged radially around a central cylindrical framework. In the entire airship

There is an especial demand in Norway for electrically driven vehicles, due to good roads and low power rates.

Inventor Ing. Langer

To be built by a German in Berlin

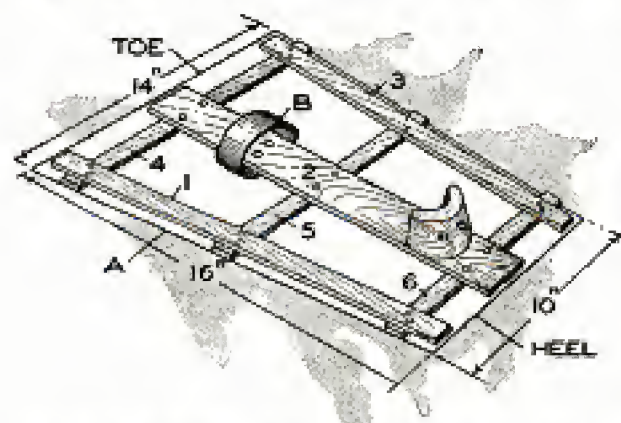


Substitute for Dynamo Oil

One night I found that I had so little dynamo oil left that a burned-out bearing would be the result if the machine were run much longer. A diligent search was of no avail, and nothing but some kerosene could be found. In the medicine chest there was a large bottle of vaseline. Taking quite a bit of this, I placed it in a tin cup and heated it till it melted, then poured some of the kerosene in it and allowed it to cool. In cooling it hardened, and by adding more kerosene, I made it the consistency of thick cream. The oil cups were filled with this grease, and it gave good results.—Contributed by E. A. Gardener, Rochester, N. Y.

A Swamp Shoe

The frame is made of narrow strips of wood, the center piece being somewhat wider than the others, or a trifle wider than a shoe sole, to which a toe strap is attached. The frame is then covered on the under side with sheet metal. Such a device is a boon to duck hunters

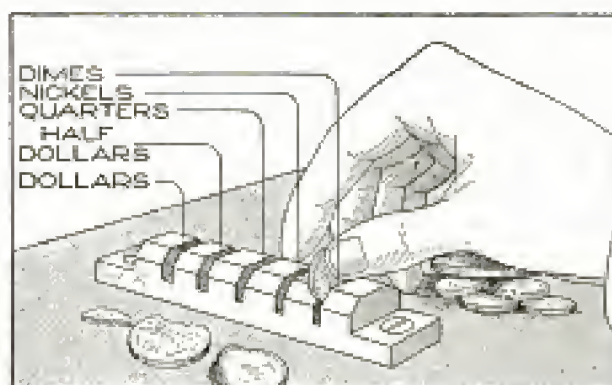


The Shoe Is Similar to a Snowshoe, and is Used to Walk in Swamps

and others that may need to travel over swamp land.—Contributed by J. C. Noble, Toronto, Can.

A Counterfeit-Coin Detector

Genuine coins will not break and are exceedingly hard to bend. Owing to this characteristic composition it is



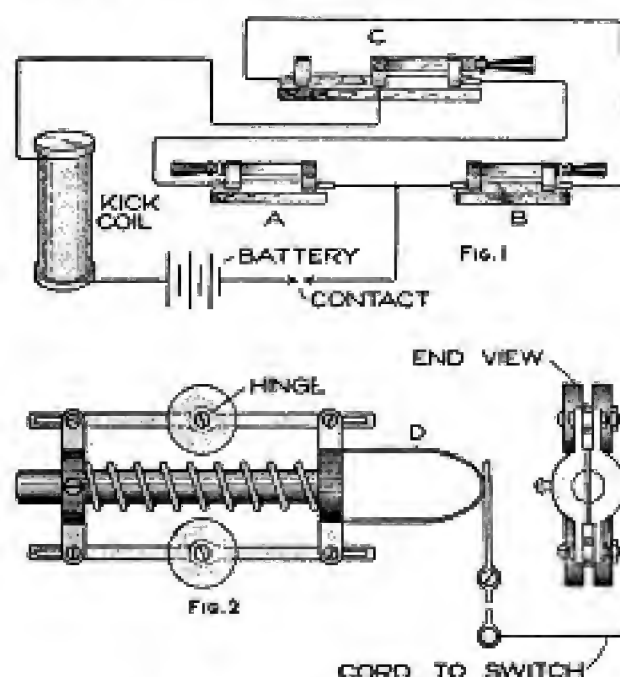
A Genuine Coin will Not Break, and It Is Exceedingly Hard to Bend

easy to provide a detector to test out the coins that appear to be counterfeit. Such a detector can be made of a piece of brass, 4 in. long and $\frac{5}{8}$ in. square. Cut off at each end a piece, $\frac{1}{2}$ in. long by $\frac{3}{8}$ in., as shown, and drill holes for screws to fasten it to a desk or other convenient place. Cut five slots about $\frac{1}{2}$ in. apart, $\frac{3}{8}$ in. deep and a trifle wider than the coins, for a nickel, dime, quarter, half, and a dollar. To use, insert the coin in the proper slot and press forward. If the coin is a counterfeit it will easily bend or snap in two.—Contributed by Maurice Baudier, New Orleans, La.

To Open Ignition Circuit Automatically When Gas Engine Stops

Considerable difficulty is experienced in the operation of gas engines with a make-and-break ignition circuit in having a run-down or discharged battery caused by the engine stopping where the sparking contacts are touching and the attendant failing to open the battery circuit. It is the object of the

automatic device described to prevent such a thing happening, and its operation, in brief, is as follows: The wiring



A Governor to Operate Switches in an Ignition Circuit When a Gas Engine Stops

of the ignition circuit is shown diagrammatically in Fig. 1. The two switches A and B are single-pole pull switches; that is, they are operated by pulling a small chain or cord, alternate pulls opening and closing the circuit. The switch C is a single-blade, double-throw type.

A special governor, similar to the one shown in Fig. 2, serves to operate the two switches A and B, Fig. 1. When the governor is revolving, the V-shaped piece D moves to the left and thus loosens the tension on the cord connected to the switches. When the engine stops the switches are both operated, so that if one was originally closed and the other open, the switch C will need be changed in order to close the ignition circuit again. The construction of the governor is not given in detail on account of the wide variation in requirements, but the one illustrated will work quite satisfactorily if properly constructed.

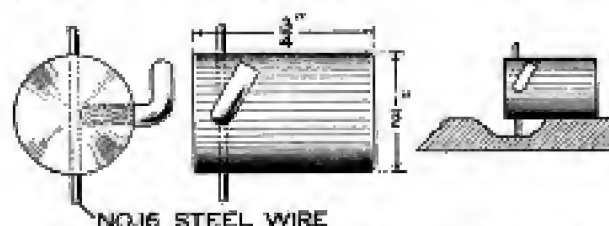
ⒸThe flanges, or washers, used on an emery-wheel arbor should have a slight concave to their face.

Running Motorcycle with Acetylene Gas

Gas in tanks used for lighting purposes on motorcycles can be used to advantage, in cases of emergency, to run the motor when the gasoline gives out. A piece of $\frac{1}{4}$ -in. rubber hose, such as is used for connecting up gas lamps, should be carried in the tool kit, a piece about 3 ft. long being sufficient. When it is necessary to use the gas from the tank for running the engine, disconnect the gasoline-feed pipe from the carburetor and attach the rubber hose from the lighting tank. Remove the small needle valve which is attached to the float to give the gas a free passage. It will be necessary to alter the air adjustment slightly.—Contributed by A. Dane, Pottstown, Pennsylvania.

Depth Gauge to Measure Pits in Boiler Plates

In the inspection of boilers for conditions of sheets, the discovery of pitted portions is not uncommon. In reports of boiler conditions, the depths of such pits must be exactly recorded. In making many of these report sketches, one inspector makes use of a very handy pocket depth gauge with which it is possible to ascertain quickly the depth of the sheet to which the metal has been corroded. The body of the gauge is simply a piece of $\frac{1}{2}$ -in. round steel, about $\frac{3}{4}$ in. long. The thumbscrew and needle attachment are easily fitted in drilled holes. The il-



Depth Gauge Made of a Small Rod and Wire to Measure Pits in Boiler Plates

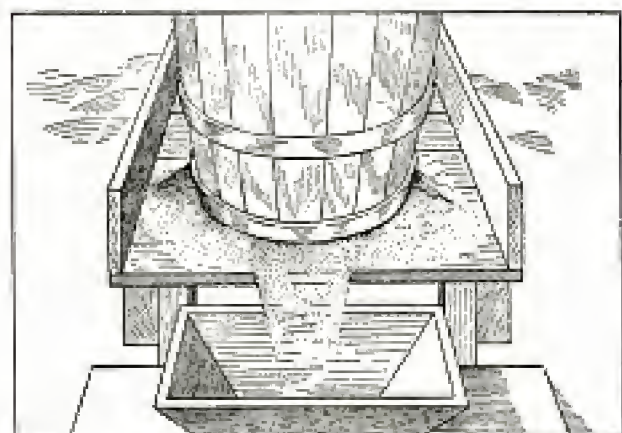
lustration of the gauge shows its application clearly.

Such measurements can be taken with a scale and a piece of wire, but wire is not always easy to find, and a

long scale cannot be used as a straightedge in many places. The gauge is something easily carried in the pocket, and can be used in almost any place on a boiler where a sheet pit is liable to occur.—Contributed by F. W. Bentley, Missouri Valley, Iowa.

To Empty a Barrel Gradually

The sketch shows a labor-saving method of emptying a barrel of powdered, or granular, material where the emptying is to be done slowly. Instead of taking out the material by scoops in order to fill it gradually into a machine hopper, for instance, the workman quickly upends the headless barrel and works it over toward the edge of the platform and the material flows to the hopper. As the barrel settles down it must be rocked



An Overturned Barrel on a Table, or Platform, will Permit Its Contents to Run Out Slowly

slightly so as to keep the material flowing. When empty, there is a small amount on the platform to be scooped into the hopper.—Contributed by J. J. O'Brien, Buffalo, N. Y.

Lawn Cleaner and Sprinkler

Caretakers of a large acreage surrounding a capitol building found it difficult to keep the lawn clear of leaves that fall from the large elm trees in autumn with the use of the ordinary hand rake. One of the men devised a special apparatus to serve as a rake and sprinkler combined. This is shown in the illustration and consists of an iron-pipe nozzle bent to direct the stream of

water parallel with the ground. The jet of water drives the leaves ahead of it and clears an acre in a short time,

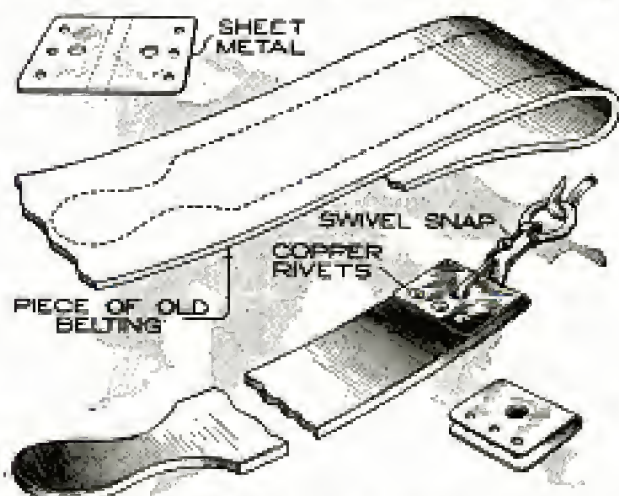


The Hose Nozzle Serves a Double Purpose, That of Sprinkling and Removing the Leaves

leaving the lawn clean and well sprinkled.—Contributed by B. O. Darrow, Sacramento, Cal.

Razor Strop Made of an Old Leather Belt

Owing to the continual stretching and smoothing over the pulley face, a section of an old leather belt makes an excellent razor strop. Soak it in oil for a time and remove the grit, then equip it with a metal tip, fastened with small rivets and drilled with a hole for slipping on a swivel snap. This snap

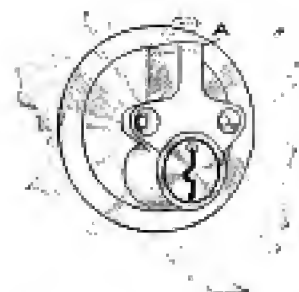


A Piece of Old Leather Belt Fitted Up for Use as a Razor Strop

makes it reversible. Rub polishing rouge on the rough side for putting on the edge, and leave the smooth side as it is for finishing.

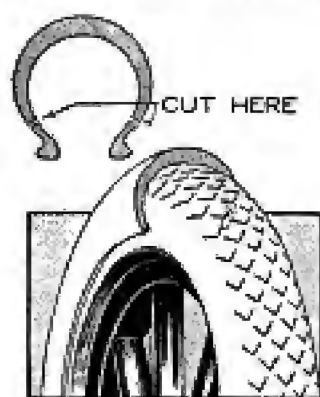
Fitting Keys to Non-Take-Apart Cylinder Locks

With a hacksaw, cut the metal on the line A down to the rim, and bend the small strip back, as shown by the dotted lines. This will expose the plunger-pin holes. Remove the springs and plunger pins, then the cylinder plug can be easily removed. A key can be fitted by using the same pins and springs. In assembling, be sure that the strip of metal, which holds the pins and springs in place, is bent back in its original position and soldered. A tumbler-pin cylinder lock is burglar-proof and cannot be picked or operated by a skeleton key.—Contributed by William J. Tolson, Lyons, Iowa.



Tire Economy

Many old tire shoes are sold for old rubber while they still have much service in them, and some owners, who are not economical, buy protectors when an old tire could be used for the same purpose. Tires generally blow out or wear out on the tread, or road surface, long before the sides show the slightest abrasion. If the old tire, about to be sold for junk, is cut all around, as shown in the sketch, to remove the bead, it forms an outer protector, or cover, that will protect some tire already on the car which is showing signs of failure in the near future. By placing a bad spot of the cover on a good section of the tire two weak places will not be in line. Two such old tires put to-

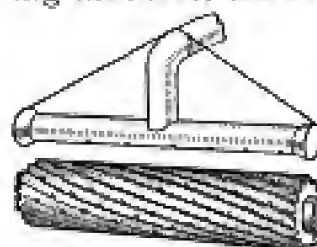


gether will last a considerable length of time.

To apply the cover, deflate the tire or remove it from the rim altogether. The latter is the easiest way, even though two persons are required and a couple of tire tools. Anyone who has applied such a cover will have no doubt of its staying on when inflated.

Distributing Oil to Wide Milling Cutters

When using a wide cutter on a milling machine, the ordinary single spout



from the oil bucket directs the oil to only one place on the cutter, frequently leaving the other parts without sufficient

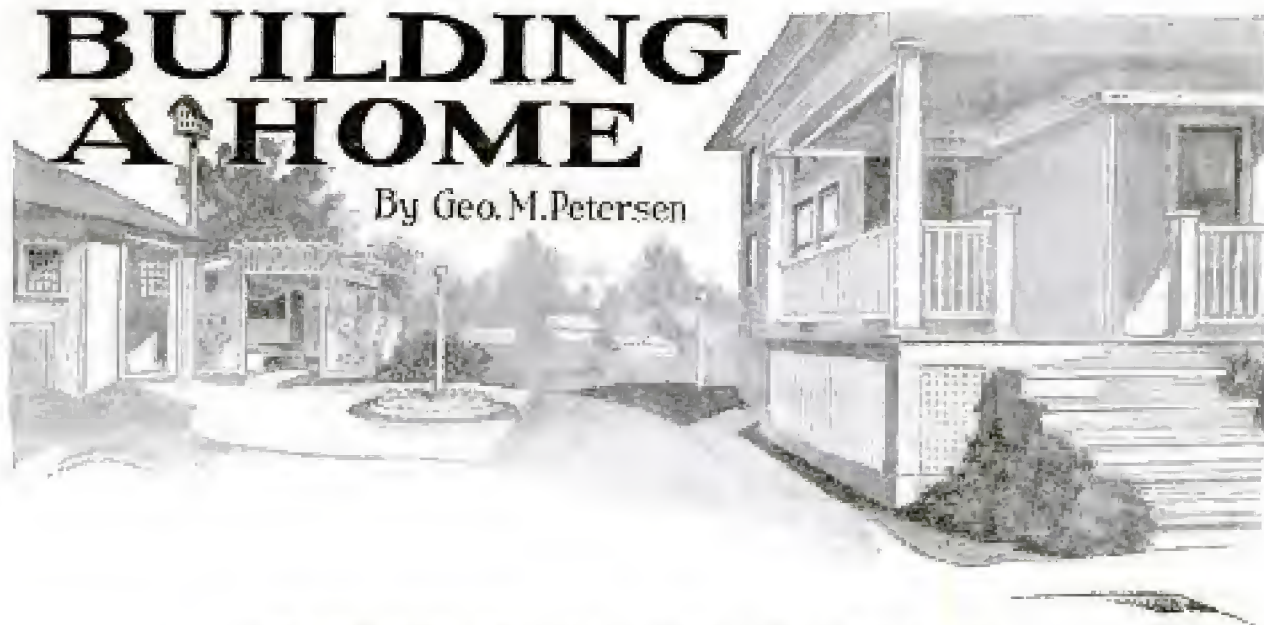
lubrication. To overcome this, an oil distributor can be made from a piece of small tubing, with holes drilled for the desired number of spouts. One hole should be provided in the center to admit the spout of the oil receptacle. The ends of the tube are plugged up with corks, or wood, and the device is held in place by a wire fastened to each of its ends, and suspended from the nozzle.—Contributed by G. Jaques, Chicago, Ill.

How to Mix Lime Mortar

In mixing mortar a stronger batter will be had by adding some lime to the water used for making the mixture. A mixture consisting of 3 parts of fine sand, 4 parts of coarse sand, 1 part of old slaked lime, and some water, will make a good mortar. The very best, however, is made when the lime has been slaked and buried in the ground for some weeks, or even months. The mixed mortar can be buried, and it will prove fully as strong as cement, besides being like butter in applying it on the surface. Freshly made mortar is short and hard to apply.—Contributed by A. Kelly, Malvern, Pa.

BUILDING A HOME

By Geo. M. Petersen



PART VII—Plumbing, Heating, and Lighting

THE average person when inspecting a home, or, in fact, a building of any kind, often neglects to a certain extent the plumbing, heating, and lighting items. In reality these branches of building construction are as important as anything that goes to make a complete job.

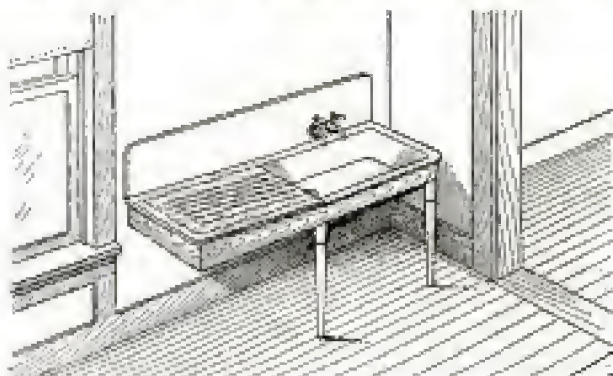
Plumbing

The plumbing in the average home is often improperly laid out both in point of convenience and sanitation. For example, the average kitchen sink is set far too low to make it easy for a woman of ordinary height to wash the dishes, or do other similar work, without straining her back. This feature can be readily overcome if the plumber is instructed before work is started as to the height at which the sink is to be placed.

While considering sinks it may be well to mention the subject of drain boards. While the old-fashioned maple drain board requires considerable attention and work to keep it clean and bright, it is, nevertheless, a great help in saving the china from being broken. The enameled-iron drain boards are much more sanitary but very hard on china and glassware if the housekeeper is the least bit careless. The enamel, too, is quite easily cracked, and nothing looks worse than a white-enamel drain board showing the black iron below in spots. Many housewives that have

enameled drain boards use in connection with them a wire basket to place the dishes in, and this system is all right providing no soap or soapy water is on the drain board. The soap makes the basket slide easily into the sink.

The location of the sink in the kitchen is another important feature which is often overlooked until it is too late. The sink should be in a light place, preferably with the light coming from the left, but should never be directly in front of a window, as it is harmful to have the light falling di-

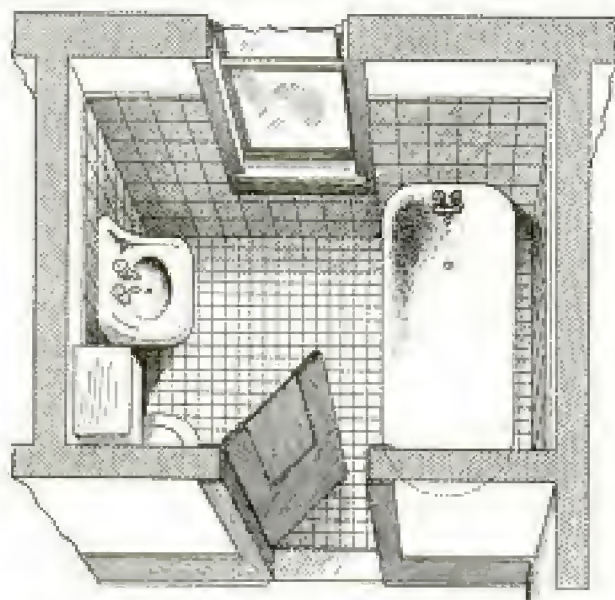


The Sink should be Located in a Light Place with the Light Coming from the Left

rectly into the eyes, and besides, the frost and cold in the winter is very apt to freeze the water pipes. The standard size of a kitchen sink is 30 in. long by 20 in. wide, and of the drain board, 24 in. long by 20 in. wide. It is necessary to see that proper space has been allowed for these fixtures.

In laying out the bathroom, the aver-

age architect or plumber places the bathtub directly under the window, which makes it necessary for a person to lean over the tub to open or close it.



Proper Location of the Bathtub, Lavatory, and Toilet in a Small Bathroom

This is due to the fact that the average bathroom in modern houses is so small that it is often difficult to know how to work in the fixtures.

It is a good plan to take the advice of an expert, and locate the bathtub where it will not be in the way of the window. A bathroom should never be less than 7 ft. by 7 ft.—49 sq. ft. of floor space—or its equivalent, with a width never less than 5 ft. Bathtubs range in length from 4 ft. to 6 ft. by 6-in. steps. This means the over-all outside dimension and allows for exposed pipes. Nothing is more annoying to the owner than to have the plumber report that a partition must be moved a little to allow for the setting of the tub. If this is the architect's mistake, the owner will have to pay the expense.

Another point to remember in bathtubs is the width of 30 in., over-all. The owner must see to it before the rough plumbing is put in, that there will be room enough between the toilet and lavatory and the tub to allow free passage. Tubs should be set at least 6 in. from the walls for cleaning the floor and wainscoting behind them.

The position of the toilet is preferably back of the door so that when the door

is left open the toilet is not in view. The standard lavatory is 20 in. by 24 in., and this fixture should have at least a 10-in. back with a 6-in. apron, all cast in one piece. Bear in mind that there are three grades of enameled ironware, namely, nonguarantee, two-year guarantee, and five-year guarantee articles. The last-mentioned articles are naturally the highest-priced, and there is quite a difference in the cost of five and two-year guarantee fixtures, while the difference in cost between the two-year guarantee and nonguarantee is very small. Most plumbers will not use the nonguarantee ware, as they are compelled to buy it in the crate and cannot inspect it before the purchase. It is a well-known fact among plumbers and contractors that if an enameled-iron fixture is going to "go bad" it will show up within three or four months after the fixture is set, and for that reason it is a waste of money and time to put in a five-year guaranteed article. Of course, the guarantee on the article is simply against imperfections in either the enameled surface or the iron, and while the manufacturer will replace the article, he will not stand for the cost of delivery or the cost of taking out the old fixture and putting in the new, and this is the main reason why plumbers hesitate to change fixtures even though they are guaranteed.

The location of the laundry trays is preferably in the rear of the basement where unobstructed light from the back yard will make artificial light unnecessary. Laundry trays are known as one, two, and three-part trays. They are made from slate and from concrete, the latter being as serviceable as the former and the price considerably less. The three-part tray is the one most used and measures 24 in. by 72 in.

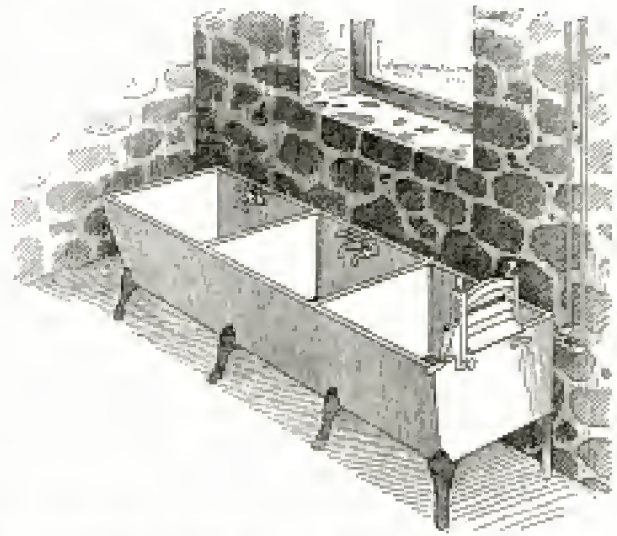
The rules and regulations of the board of health in the larger cities require that all sewer pipe placed under the basement floor should be of extra-heavy cast iron. Sewers run outside of the foundation may be vitrified-clay tile, and this tile, when laid with cemented joints, is far superior to the cast-iron pipe. This is partly

due to the fact that iron collects the grease which comes from the various fixtures and will eventually clog up to a certain degree, thereby hindering the refuse material from passing through freely to the sewer. In placing a sewer pipe under a basement floor, it is usually laid near the surface and often the floor breaks down, or is undermined by it. In outlying districts of a city the sewer trunks are usually not placed deep enough in the earth, and an iron pipe placed under the basement floor will not have the proper pitch to the house sewer to carry the sewage away quickly. When the trunk sewer is high, it is sometimes well to place the laundry trays in the kitchen, thereby keeping the sewer up at a higher level at the house than would be possible if they were placed in the basement. It is sometimes necessary in a large building to siphon the sewage out into the trunk sewer. When the sewer is low enough, floor drains should be placed in the basement so that it can be flushed once or twice a year and cleaned. A drain should also be placed at the laundry trays so that any surface water that accumulates will run off.

Heating

The three systems of heating in common use are hot air, steam, and hot water. The first-mentioned system, while the oldest of the three, is quite satisfactory when properly installed and operated. There are two kinds of hot-air heating furnaces, one being the built-in kind and the other known as the portable type. A portable furnace is one that can be readily moved, if necessary, without taking out brick walls and the like. The better class of portable furnace is known as the tubular, and this type is almost as expensive as a hot-water furnace. With the regular portable type, the cold air is drawn from outdoors and circulates around the fire pot, which is heated by the coals on the grate. With the tubular furnace, however, the operation is slightly different in that the air is drawn in and circulated through the tubes and heated as it passes through them; the operation

being very similar to that of the tubular boiler in which the water is circulated through tubes and goes out heated to the boiling point. Some of the points



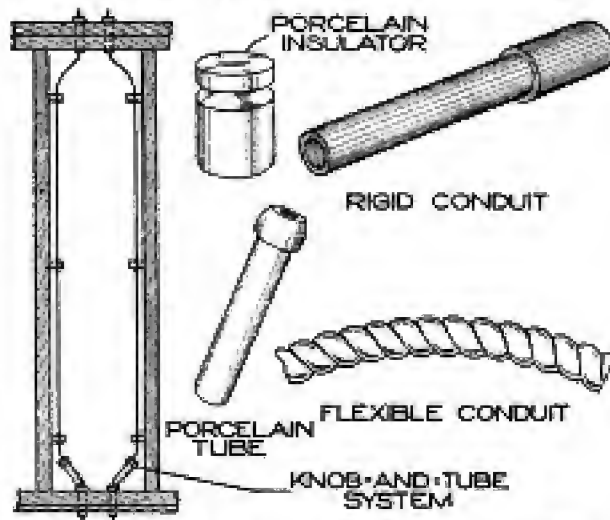
A Three-Part Laundry Tray Set Up in the Rear Part of the Basement

to be watched to get satisfactory results from a hot-air plant are to get the cold-air box on the prevailing-wind side of the house; to locate the furnace as near the center of the house as possible, and to set it as low as possible so that there will be no horizontal runs of pipe, or if they must be horizontal, that they will be as short as possible, as heat will rise readily, but will not flow through a horizontal flue without being forced. In preparing the foundation for a portable furnace, do not dig a pit and set the furnace in it, as the basement dampness will settle to the lower point and eventually rust out the iron jacket.

Hot-air furnaces must have some attention, and three of the most essential things are to provide plenty of fresh air, to keep the water tank filled, and to remove the ashes from under the grate. If there is an insufficient amount of fresh air the furnace will not have enough pressure to force the heat through the registers at the farthest points from the furnace. If the water box is not kept full, the air in the house will become dry, causing damage to the furniture as well as being unhealthful.

There is a great difference of opinion as to which is the better heat, steam or hot water. Steam heat works similar to

the old base-burner stove, and an even temperature cannot be steadily obtained. This is due to the fact that when the steam is up and circulates through the pipes at a high temperature,



The Usual Installation of Electric Wiring is Known as the Knob-and-Tube System

the radiators get intensely hot, but when the register is shut off, the steam rapidly condenses and the radiator chills. This condensed steam is also responsible for the annoying hammering sound which is often heard in a steam-heating system. Buildings may be heated very quickly with steam, as the heat is so intense, but it chills as rapidly.

With a hot-water plant, the water is in continual circulation just as long as there is any heat in it, and while the temperature of the water never rises to the point of steam, it is a steady heat circulating through the pipes, and the disagreeable pounding sound is never heard in such a system. The piping of a hot-water plant must be larger than that of a steam plant, but it is a damper heat and does not shrink and warp the furniture as does steam or hot air.

Lighting

There are three common systems of electric wiring. The cheapest and most commonly used is known as the knob-and-tube system, in which the wires are run on porcelain knobs between the joists and in porcelain tubes through partitions. The others are the flexible and rigid-conduit systems. Rigid conduit is simply an iron pipe with a baked

coat of enamel both on the interior and exterior. The wires are carried from the conduit and brought through outlet boxes. Rigid conduit is often used in the basement of a house which is wired elsewhere with the knob-and-tube system. The flexible system is used for fixtures, and for wiring old houses where it is impossible to get knob-and-tube work in without destroying the floors and plaster. Under these circumstances the wires are often run in circular casings consisting of a canvas covering treated with insulating compound.

To save future annoyance be sure that the lights in the house are properly located and are of sufficient size. The location of fixtures in bedrooms should be on the side wall where the dressing table will be placed, and not closer than 5 ft. apart and about 4½ ft. from the floor. All side-wall outlets should be what is known as combination fixtures, gas and electric. Kitchens should have a combination light over the sink and a ceiling light over the stove, or in the center of the room. Living rooms should have a center outlet and from two to eight combination side-wall outlets. Bathrooms should have one side-wall outlet on each side of the medicine cabinet, which is usually placed over the lavatory. The lighting scheme for the dining room should be similar to that of the living room, except that the candlepower of the lights should not be so great.

Punch-Press Operation as a Substitute for Tapping Holes

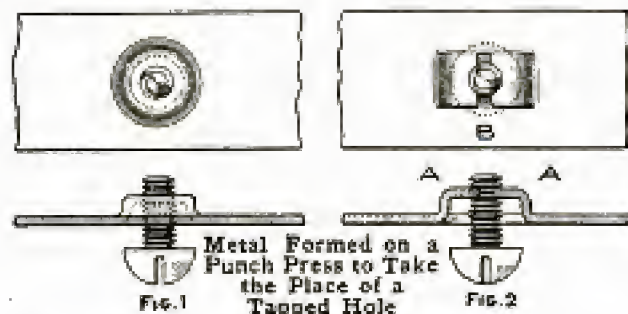
Very frequently large quantities of a standard thin sheet-metal part must be threaded to hold a screw, and the general practice is to draw the metal and tap it as shown in Fig. 1. Obviously, in addition to the press operation of drawing the shoulder, comes the cost of the tapping operation.

A superior method to this is shown in Fig. 2. This is actually a substitute for the tapping operation, and is done in a punch press, together with any other regular press operations. Two

tongues of the metal are projected outward, as shown at A, and separated slightly, as at B. The projecting edges are hollowed out, corresponding to a circle whose diameter is that of the pitch diameter of the screw to be used. The screw, in being driven through, will engage with these tongue edges, which adapt themselves to the pitch of the screw, acting as one complete thread.

Although there is only one thread, it has the advantage that the tighter the screw is forced the firmer will be the grip of the tongues on the thread, owing to the resulting inward draw of these tongues. By experiment it has been found that on small-size screws, up to about 10-32, it is impossible to strip the nut before breaking the screw.

It is evident that this arrangement can be used successfully wherever the thickness of the metal is slightly smaller than the pitch of the screw, and in certain classes of work it is more

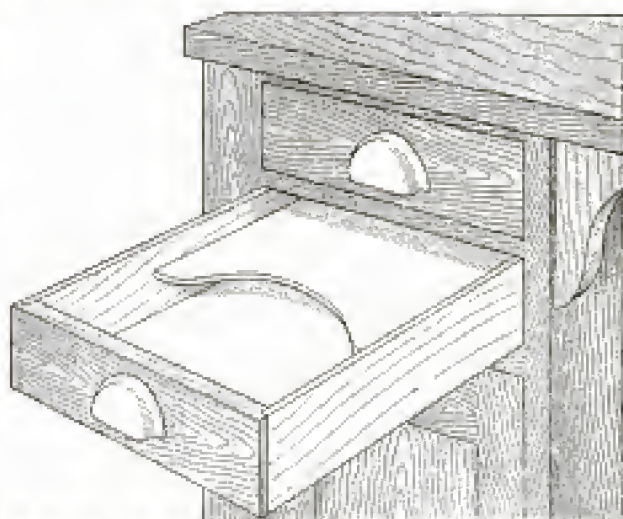


convenient than other means. It eliminates a tapping operation and allows other press operations at the same time of the punch-press tapping operation.

Drawer with an Inclosed Shelf

In deep drawers, particularly those used in a buffet or dresser, the space may be made more useful if a shelf is inserted in the manner shown in the sketch. This represents a drawer which I fixed with a shelf. The drawer was in a buffet and very deep, but it could only be used for table covers. The small things, such as napkins and table mats, could not be put in the same drawer for the reason that in taking out a tablecloth the piles would become mixed. By putting in the

shelf, however, these small pieces could be put on three sides of the drawer, and the tablecloths could be

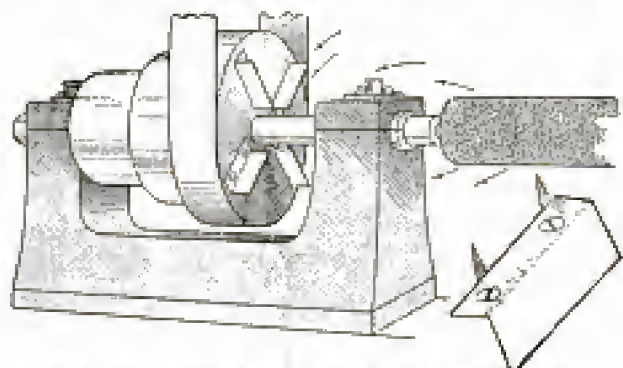


A Shelf Put in a Buffet Drawer to Make a Place for the Small Linen

put in and removed without disturbing the piles of napkins.—Contributed by Irving M. Hayward, Brooklyn, New York.

Exhaust Attachment for Dust from a Sand Roller

Workmen using a sand roller in a lathe will be in a great measure relieved from the dust if projections are fastened to the face of the cone pulley to form wings like those of a fan. The wings can be cut from sheet metal, bent at right angles to form blades. These are fastened to the pulley face with screws. They will act the same as an exhaust fan in drawing the dust and throwing

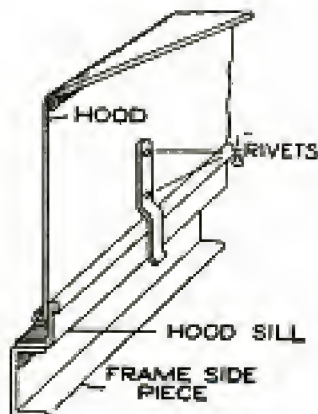


The Wings Attached to the Cone Pulley Draw the Dust and Throw It Away from the Operator

it away from the operator. The blades can be removed when not in use.—Contributed by C. M. Graham, Waterloo, Iowa.

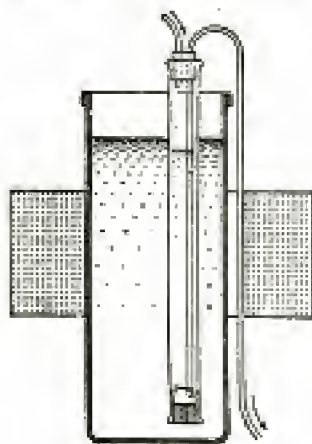
To Stop Noise of Rattling Automobile Hoods

The constant vibration of an automobile causes such parts as the hood to become loose, noisy, and rattling. This noise can be stopped in the following manner: The noise usually occurs at the point where the hood rests against the hood sill, which is bolted to the vehicle frame. A small strip of steel, $\frac{1}{8}$ in. thick and about $\frac{3}{8}$ in. wide, is bent into the shape shown so that, when the hood is down and in the right position, the strip rests snugly on the hood sill. Two strips on each side of the hood will be sufficient.



Starting a Siphon by Air Pressure

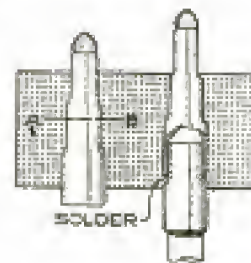
A siphon that is absolutely safe to use in handling acids or other corrosive or harmful liquids, because it is started by blowing, can be made as follows: A suitable length of glass tubing of fairly large diameter—say, $\frac{1}{2}$ to $\frac{3}{4}$ in. for ordinary laboratory use—is provided with tight-fitting rubber stoppers at both ends, one having two perforations and the other a very small one. In the two-holed stopper are inserted one short, slightly bent piece of glass tubing extending just below the stopper, and a U-shaped tube, both about $\frac{1}{8}$ in. in diameter. The inner arm of the U-tube reaches near the end of the wide tube, and the outside arm below it, as shown. When this device is inserted in the vessel containing the



liquid to be siphoned, the liquid seeks its level inside and outside of the large tube, and by blowing through the short small tube an air pressure is created in the wide tube which forces the liquid out through the U-tube, because all of it cannot pass back into the liquid container through the small perforation in the bottom stopper of the siphon. When once started, the device, of course, works automatically like an ordinary siphon.

Lengthening a Gas Burner

While assisting a gas fitter to build up some sections of brass tubing with burners, we found one piece a trifle too short. No other piece being at hand, I cut a section from a gas burner, the part below the line AB in the sketch, and filed the upper portion of it so as to fit into the lower section of another burner. This section was screwed on the tube and the burner slipped over it and soldered, as there were no threads on the cut-off section. The tube being covered with an imitation candle, the repair could not be seen.—Contributed by James M. Kane, Doylestown, Pa.



A Cash Register Used as an Adding Machine

A person having a number of long columns to add but no adding machine, used his cash register as a substitute. By pushing the keys and opening and shutting the drawer in the usual way each horizontal line of figures was registered, and the totaling mechanism showed the sum correctly. As it was impossible to register \$100 on the machine at one operation, the large amounts were split and made in two counts. Aside from being rather noisy, the substitute adding machine was a decided success.

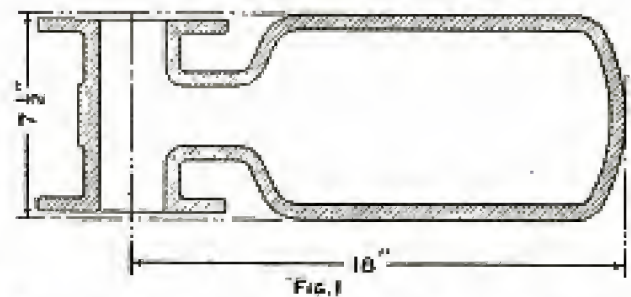
Pattern and Core Box for a Small Air Chamber

Small air chambers of a form similar to the one illustrated in Fig. 1 are quickly and easily made if the half pieces are glued up solid. Two pieces of 2-in. stock are used for each half pattern.

The stock is prepared for the lathe in the usual way by jointing the halves and inserting the dowels. Enough extra stock is allowed at each end for the screws that are to hold the halves together. In Fig. 2 is shown the piece for the body of the chamber, all prepared for turning. It will be noticed that the ends have been cut on the band saw to the radii. These should be about $\frac{1}{8}$ in., full, of the finished size on each end.

The largest diameter is first turned to size, then the neck, or smaller diame-

ter, is then finished to templet. This templet is made to just clear the end spud, and the lines for the fillet and



Drawing of an Air Chamber from Which a Pattern-maker Forms a Pattern and a Core Box

the neck end should be laid out on it, as it is used for finishing both ends.

The cross branch on the end is made with the flanges gained or checked into the prints. In Fig. 3 is shown the method of connecting or fastening the two parts with a lap joint. The lap is cut into the neck about $\frac{3}{4}$ in. in thick-

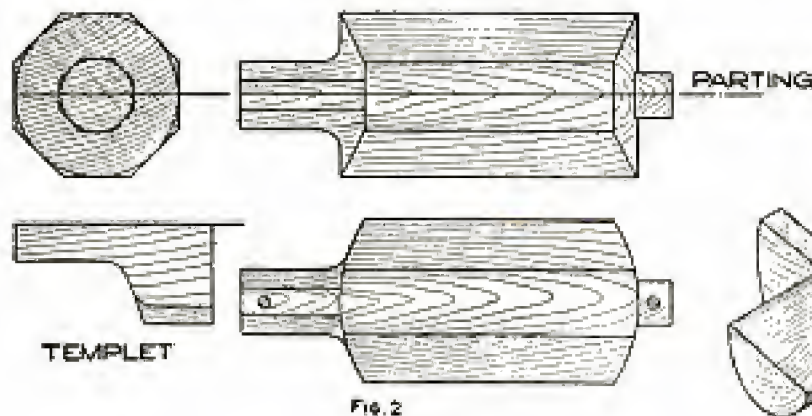


Fig. 2

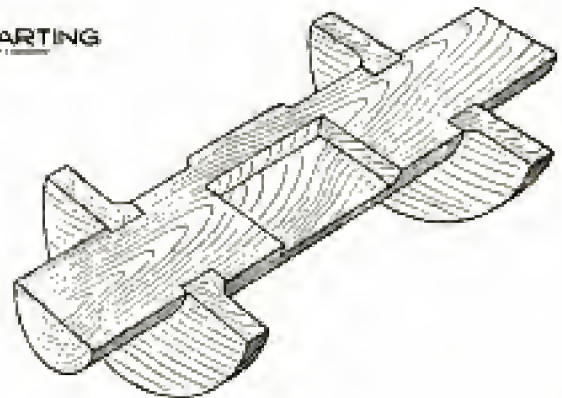


Fig. 3

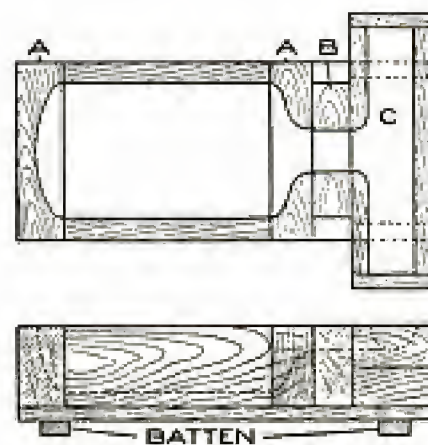


Fig. 4



Main Body for the Pattern before Turning It Up, and Templet for a Guide in Shaping the Ends; Manner of Attaching the Cross-Branch End, and the Construction of the Core Box

ter, is finished. The rest is then moved to the top, or crown, end, and the spud on the end with the screw in it is turned to, say, 2 in. in diameter. The

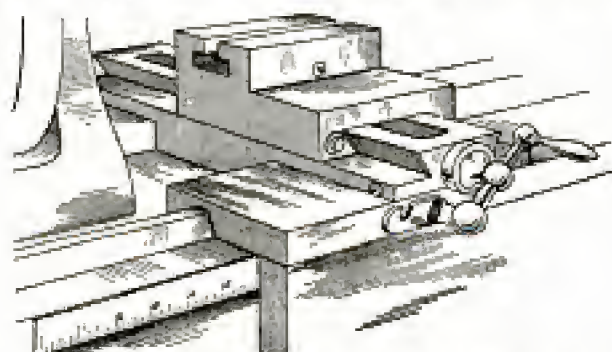
ness, and a recess is routed out of the cross branch to receive it. This makes a very strong joint, and when fastened with glue and screws, it is not apt to

become loose with the rapping in the mold.

The core box, Fig. 4, is made up of five pieces, fastened to a bottom board. The pieces marked A are turned in halves on a faceplate, B and C are worked out with the core-box plane. The piece B is fastened with glue and screws to one of the pieces marked A, and the large round corner is worked off to a templet. Two pieces of stock are fastened to the bottom board to raise the piece C to the same level as the other pieces.—Contributed by J. A. Shelly, Brooklyn, N. Y.

Guide for Longitudinal Lathe Feed

An ordinary 12-in. flexible-steel scale fastened to the bed of a lathe makes a good guide for the longitudinal feed.



Steel Scale Fastened to a Lathe Bed, to Provide a Guide for the Longitudinal Feed

This is a very handy device for roughing out work and is easily applied. In my case, I have placed the scale on the front of the bed, and the carriage passes over it, but it can be placed on top of the bed if desired.—Contributed by A. E. Holiday, Union City, Conn.

Metallic Effect on Clockface Decorations

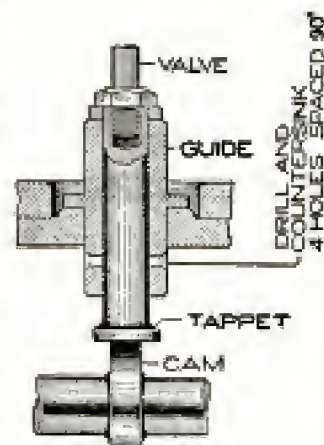
In repainting the ornaments on an old clockface, I found that the metallic luster shining through the color had been secured by first laying a piece of metal leaf, silver or gold, on the surface and in the exact shape of the ornament. In the case mentioned it was a sea shell. The desired effect was secured by glazing it lightly or heavily with the proper colors.

To Determine the Coloring Matter of a Typewriter Ribbon

There are two kinds of typewriter ribbon, one that gives an indelible record and one that does not. The color used for the former has a true carbon base, while the latter is made with aniline colors. To distinguish the two, soak a corner, or piece, of the ribbon in very hot alcohol, scrape off a little of the coloring matter and smear it on a piece of white blotting paper. The smear will widen on the blotting paper as the alcohol is soaked up by it, and if this spot is colored all the way to the edge, the color used is aniline, that is, the ribbon is of the cheaper grade that does not produce an indelible record, while, if the size of the original smear is simply surrounded by an uncolored edge of wet, it is a sure sign that the ribbon is made with genuine carbon color. The reason is that aniline black is dissolved by the alcohol, while true carbon black is not.

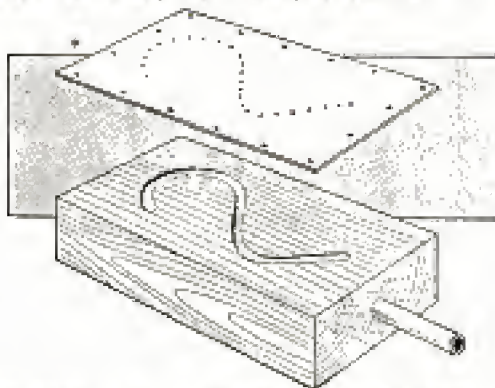
Lubricating Tappets on an Automobile Engine

The existence of friction in a gasoline engine, or, in fact, any machine, necessarily means a loss of power, particularly at such an important point as the valve tappet. In order to minimize the friction at this point it is well to drill four reasonably large holes in the tappet guide, as shown in the sketch. This will allow the lubricating oil in the crank case to find its way more readily to the tappets. It is well to slightly countersink these holes for the purpose of allowing the oil to reach the inside of the guide readily.



Making a Special-Shaped Gas Flame

Anyone who has attempted to temper small tools, or bend pieces of steel, knows how difficult it is to get a uniform heat without overheating. The most satisfactory solution is to make a special gas stove in the manner illustrated, which will not require much time in the construction. Cut out a small block of wood, 1 in. thick, and hollow out a small channel of the desired shape with a knife. Bore a $\frac{1}{4}$ -in. hole in one end and connect the channel by means of a second hole drilled in a vertical direction. Force a short piece of brass tubing into the end hole for the gas connection, and then cut out a piece of tin or sheet metal large enough to cover the top. Lay out the desired curve on this in a position directly over the curved channel in the block. Prick, or drill, a series of pin-



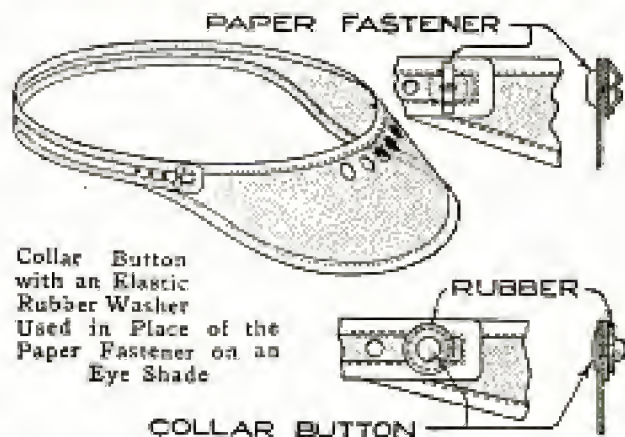
A Gas Stove That Produces a Special-Shaped Flame to Temper Pieces of Bent Steel

holes in the metal along the curved line, making the holes about $\frac{1}{4}$ in. apart, and then tack it firmly to the block. If the gas can be arranged to pick up a little air as it passes into the stove, in the same manner as this is done in the ordinary gas range, the flame will be free from carbon.—Contributed by John D. Adams, Phoenix, Arizona.

Adjustable Fastener for Celluloid Eye Shade

The head strap of a celluloid eye shade is usually held with a brass paper fastener which often breaks when no fasteners are at hand. A much better way is to use a very small bone or com-

position collar button secured with an elastic rubber washer slipped over the

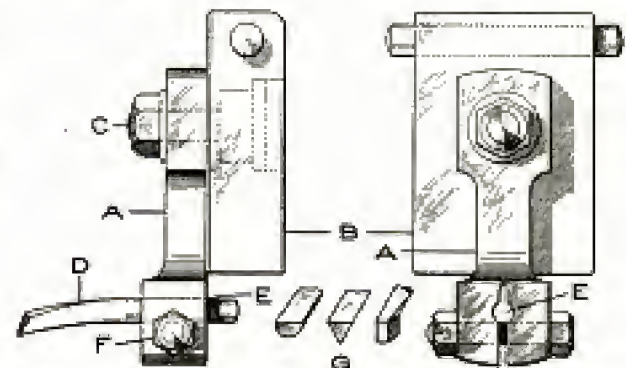


head. This method admits quick adjustment of the shade and is not at all clumsy.

Tool Holder for Machining Blanking Dies

The illustration shows a holder and tools especially designed for use in machining blanking dies. The holder can be adjusted to accommodate the return stroke of the shaper and can be used to get any desired shape by forging the proper tools.

The holder A is held firmly to the swivel block B by means of a clamping screw, C. The cutting tool D passes through the hole E where it is clamped with the screw F. Various tools, like those shown at G, can be forged to meet requirements. The tools are forged from $\frac{3}{8}$ -in. drill rod, and the screw C

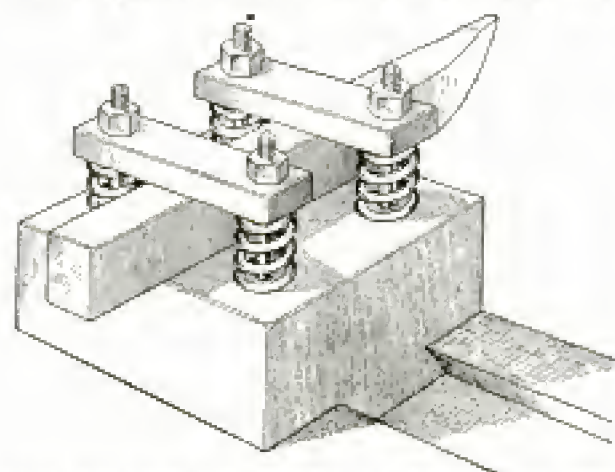


Adjustable Tool Holder Attached to the Shaper Head Block for Shaping Blanking Dies

and holder A made of machine steel. The screw F is a stock-size, $\frac{3}{8}$ -16, cap screw with a nut.—Contributed by George F. Kuhne, E. Rutherford, N. J.

Lifting Springs for Tool-Clamp Plates

The tool holder, or clamp plates, on heavy lathes cause considerable trouble by dropping down when the heavy tool

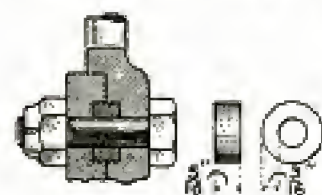


The Coil Springs Placed on the Bolts under the Plates Keep Them Up

is drawn out for sharpening or change of cutting edge. The sketch shows how a number of comparatively heavy steel-wire springs can be utilized to raise the strips free of the tool and hold them up out of the way as soon as the nuts are loosened. Much loss of time and injury to fingers will be avoided by the springs on any tool-holding arrangement of this kind.

Preventing Flywheel from Breaking Fastening Bolts

It happens quite frequently that the bolts connecting the flywheel to the crankshaft flange shear off, due to their carrying an excessive strain. To prevent trouble of this nature, I inserted



a small drive collar on each alternate bolt of the six which were used. The flywheel and crankshaft were counter-bored, and the three collars were securely pressed into them when the bolt nuts were tightened up. In this manner the three collars did the greatest part of the work, and therefore the bolts were relieved to a great extent.—Contributed by Adolph Kline, New York City.

An Electric Remote-Control Switch

The remote-control switch described will be found very serviceable when it is desired to control electrical circuits from one or more points that may be quite a distance apart, or that may be in different buildings, or on different floors of the same building. The switch mechanism consists of two electromagnets, each operating a separate armature, and so connected that they may be energized independently by merely pressing one of two push buttons located at the points from which it is desired to control the switch. One of these magnets is called a closing magnet, because its armature, when drawn up, closes the main electrical circuit, and the other is called the opening magnet, because the electrical switch is opened when its armature is drawn up. A sketch from which the electrical and mechanical operation of the switch may be understood is shown in Fig. 1. The armatures of both magnets are pivoted at one end, and a spring is attached to each at the hinge which tends to hold them away from their respective cores. A V-shaped piece of metal, A, is attached to the free end of the armature of the closing magnet, which serves to connect the two springs B and C when the armature is drawn up against the core of the magnet. The two springs B and C form the terminals of the electric circuit which the switch is to control. A specially shaped piece of metal, D, is fastened to the free end of the armature of the opening magnet, which serves as a double latch for the armature of the closing magnet. If the armature of the opening magnet is drawn up, the armature of the closing magnet will move under the action of the spring away from its core until the free end strikes the end of the piece D, and the connection between the springs B and C will be broken. When the armature of the closing magnet is drawn over against its core, its free end moves beyond the bend in the piece D, the armature of the opening magnet moves by the spring away from its core, and the

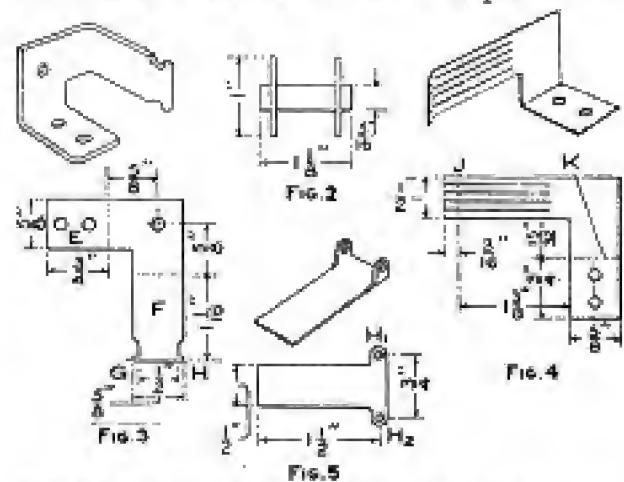
See sketch on page from "The Electrician's Handy Book" by J. C. Bennett, 1913, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 1951, 1953, 1955, 1957, 1959, 1961, 1963, 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049, 2051, 2053, 2055, 2057, 2059, 2061, 2063, 2065, 2067, 2069, 2071, 2073, 2075, 2077, 2079, 2081, 2083, 2085, 2087, 2089, 2091, 2093, 2095, 2097, 2099, 2101, 2103, 2105, 2107, 2109, 2111, 2113, 2115, 2117, 2119, 2121, 2123, 2125, 2127, 2129, 2131, 2133, 2135, 2137, 2139, 2141, 2143, 2145, 2147, 2149, 2151, 2153, 2155, 2157, 2159, 2161, 2163, 2165, 2167, 2169, 2171, 2173, 2175, 2177, 2179, 2181, 2183, 2185, 2187, 2189, 2191, 2193, 2195, 2197, 2199, 2201, 2203, 2205, 2207, 2209, 2211, 2213, 2215, 2217, 2219, 2221, 2223, 2225, 2227, 2229, 2231, 2233, 2235, 2237, 2239, 2241, 2243, 2245, 2247, 2249, 2251, 2253, 2255, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 2271, 2273, 2275, 2277, 2279, 2281, 2283, 2285, 2287, 2289, 2291, 2293, 2295, 2297, 2299, 2301, 2303, 2305, 2307, 2309, 2311, 2313, 2315, 2317, 2319, 2321, 2323, 2325, 2327, 2329, 2331, 2333, 2335, 2337, 2339, 2341, 2343, 2345, 2347, 2349, 2351, 2353, 2355, 2357, 2359, 2361, 2363, 2365, 2367, 2369, 2371, 2373, 2375, 2377, 2379, 2381, 2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 3007, 3009, 3011, 3013, 3015, 3017, 3019, 3021, 3023, 3025, 3027, 3029, 3031, 3033, 3035, 3037, 3039, 3041, 3043, 3045, 3047, 3049, 3051, 3053, 3055, 3057, 3059, 3061, 3063, 3065, 3067, 3069, 3071, 3073, 3075, 3077, 3079, 3081, 3083, 3085, 3087, 3089, 3091, 3093, 3095, 3097, 3099, 3101, 3103, 3105, 3107, 3109, 3111, 3113, 3115, 3117, 3119, 3121, 3123, 3125, 3127, 3129, 3131, 3133, 3135, 3137, 3139, 3141, 3143, 3145, 3147, 3149, 3151, 3153, 3155, 3157, 3159, 3161, 3163, 3165, 3167, 3169, 3171, 3173, 3175, 3177, 3179, 3181, 3183, 3185, 3187, 3189, 3191, 3193, 3195, 3197, 3199, 3201, 3203, 3205, 3207, 3209, 3211, 3213, 3215, 3217, 3219, 3221, 3223, 3225, 3227, 3229, 3231, 3233, 3235, 3237, 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3571, 3573, 3575, 3577, 3579, 3581, 3583, 3585, 3587, 3589, 3591, 3593, 3595, 3597, 3599, 3601, 3603, 3605, 3607, 3609, 3611, 3613, 3615, 3617, 3619, 3621, 3623, 3625, 3627, 3629, 3631, 3633, 3635, 3637, 3639, 3641, 3643, 3645, 3647, 3649, 3651, 3653, 3655, 3657, 3659, 3661, 3663, 3665, 3667, 3669, 3671, 3673, 3675, 3677, 3679, 3681, 3683, 3685, 3687, 3689, 3691, 3693, 3695, 3697, 3699, 3701, 3703, 3705, 3707, 3709, 3711, 3713, 3715, 3717, 3719, 3721, 3723, 3725, 3727, 3729, 3731, 3733, 3735, 3737, 3739, 3741, 3743, 3745, 3747, 3749, 3751, 3753, 3755, 3757, 3759, 3761, 3763, 3765, 3767, 3769, 3771, 3773, 3775, 3777, 3779, 3781, 3783, 3785, 3787, 3789, 3791, 3793, 3795, 3797, 3799, 3801, 3803, 3805, 3807, 3809, 3811, 3813, 3815, 3817, 3819, 3821, 3823, 3825, 3827, 3829, 3831, 3833, 3835, 3837, 3839, 3841, 3843, 3845, 3847, 3849, 3851, 3853, 3855, 3857, 3859, 3861, 3863, 3865, 3867, 3869, 3871, 3873, 3875, 3877, 3879, 3881, 3883, 3885, 3887, 3889, 3891, 3893, 3895, 3897, 3899, 3901, 3903, 3905, 3907, 3909, 3911, 3913, 3915, 3917, 3919, 3921, 3923, 3925, 3927, 3929, 3931, 3933, 3935, 3937, 3939, 3941, 3943, 3945, 3947, 3949, 3951, 3953, 3955, 3957, 3959, 3961, 3963, 3965, 3967, 3969, 3971, 3973, 3975, 3977, 3979, 3981, 3983, 3985, 3987, 3989, 3991, 3993, 3995, 3997, 3999, 4001, 4003, 4005, 4007, 4009, 4011, 4013, 4015, 4017, 4019, 4021, 4023, 4025, 4027, 4029, 4031, 4033, 4035, 4037, 4039, 4041, 4043, 4045, 4047, 4049, 4051, 4053, 4055, 4057, 4059, 4061, 4063, 4065, 4067, 4069, 4071, 4073, 4075, 4077, 4079, 4081, 4083, 4085, 4087, 4089, 4091, 4093, 4095, 4097, 4099, 4101, 4103, 4105, 4107, 4109, 4111, 4113, 4115, 4117, 4119, 4121, 4123, 4125, 4127, 4129, 4131, 4133, 4135, 4137, 4139, 4141, 4143, 4145, 4147, 4149, 4151, 4153, 4155, 4157, 4159, 4161, 4163, 4165, 4167, 4169, 4171, 4173, 4175, 4177, 4179, 4181, 4183, 4185, 4187, 4189, 4191, 4193, 4195, 4197, 4199, 4201, 4203, 4205, 4207, 4209, 4211, 4213, 4215, 4217, 4219, 4221, 4223, 4225, 4227, 4229, 4231, 4233, 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4567, 4569, 4571, 4573, 4575, 4577, 4579, 4581, 4583, 4585, 4587, 4589, 4591, 4593, 4595, 4597, 4599, 4601, 4603, 4605, 4607, 4609, 4611, 4613, 4615, 4617, 4619, 4621, 4623, 4625, 4627, 4629, 4631, 4633, 4635, 4637, 4639, 4641, 4643, 4645, 4647, 4649, 4651, 4653, 4655, 4657, 4659, 4661, 4663, 4665, 4667, 4669, 4671, 4673, 4675, 4677, 4679, 4681, 4683, 4685, 4687, 4689, 4691, 4693, 4695, 4697, 4699, 4701, 4703, 4705, 4707, 4709, 4711, 4713, 4715, 4717, 4719, 4721, 4723, 4725, 4727, 4729, 4731, 4733, 4735, 4737, 4739, 4741, 4743, 4745, 4747, 4749, 4751, 4753, 4755, 4757, 4759, 4761, 4763, 4765, 4767, 4769, 4771, 4773, 4775, 4777, 4779, 4781, 4783, 4785, 4787, 4789, 4791, 4793, 4795, 4797, 4799, 4801, 4803, 4805, 4807, 4809, 4811, 4813, 4815, 4817, 4819, 4821, 4823, 4825, 4827, 4829, 4831, 4833, 4835, 4837, 4839, 4841, 4843, 4845, 4847, 4849, 4851, 4853, 4855, 4857, 4859, 4861, 4863, 4865, 4867, 4869, 4871, 4873, 4875, 4877, 4879, 4881, 4883, 4885, 4887, 4889, 4891, 4893, 4895, 4897, 4899, 4901, 4903, 4905, 4907, 4909, 4911, 4913, 4915, 4917, 4919, 4921, 4923, 4925, 4927, 4929, 4931, 4933, 4935, 4937, 4939, 4941, 4943, 4945, 4947, 4949, 4951, 4953, 4955, 4957, 4959, 4961, 4963, 4965, 4967, 4969, 4971, 4973, 4975, 4977, 4979, 4981, 4983, 4985, 4987, 4989, 4991, 4993, 4995, 4997, 4999, 5001, 5003, 5005, 5007, 5009, 5011, 5013, 5015, 5017, 5019, 5021, 5023, 5025, 5027, 5029, 5031, 5033, 5035, 5037, 5039, 5041, 5043, 5045, 5047, 5049, 5051, 5053, 5055, 5057, 5059, 5061, 5063, 5065, 5067, 5069, 5071, 5073, 5075, 5077, 5079, 5081, 5083, 5085, 5087, 5089, 5091, 5093, 5095, 5097, 5099, 5101, 5103, 5105, 5107, 5109, 5111, 5113, 5115, 5117, 5119, 5121, 5123, 5125, 5127, 5129, 5131, 5133, 5135, 5137, 5139, 5141, 5143, 5145, 5147, 5149, 5151, 5153, 5155, 5157, 5159, 5161, 5163, 5165, 5167, 5169, 5171, 5173, 5175, 5177, 5179, 5181, 5183, 5185, 5187, 5189, 5191, 5193, 5195, 5197, 5199, 5201, 5203, 5205, 5207, 5209, 5211, 5213, 5215, 5217, 5219, 5221, 5223, 5225, 5227, 5229, 5231, 5233, 5235, 5237, 5239, 5241, 5243, 5245, 5247, 5249, 5251, 5253, 5255, 5257, 5259, 5261, 5263, 5265, 5267, 5269, 5271, 5273, 5275, 5277, 5279, 5281, 5283, 5285, 5287, 5289, 5291, 5293, 5295, 5297, 5299, 5301, 5303, 5305, 5307, 5309, 5311, 5313, 5315, 5317, 5319, 5321, 5323, 5325, 5327, 5329, 5331, 5333, 5335, 5337, 5339, 5341, 5343, 5345, 5347, 5349, 5351, 5353, 5355, 5357, 5359, 5361, 5363, 5365, 5367, 5369, 5371, 5373, 5375, 5377, 5379, 5381, 5383, 5385, 5387, 5389, 5391, 5393, 5395, 5397, 5399, 5401, 5403, 5405, 5407, 5409, 5411, 5413, 5415, 5417, 5419, 5421, 5423, 5425, 5427, 5429, 5431, 5433, 5435, 5437, 5439, 5441, 5443, 5445, 5447, 5449, 5451, 5453, 5455, 5457, 5459, 5461, 5463, 5465, 5467, 5469, 5471, 5473, 5475, 5477, 5479, 5481, 5483, 5485, 5487, 5489, 5491, 5493, 5495, 5497, 5499, 5501, 5503, 5505, 5507, 5509, 5511, 5513, 5515, 5517, 5519, 5521, 5523, 5525, 5527, 5529, 5531, 5533, 5535, 5537, 5539, 5541, 5543, 5545, 5547, 5549, 5551, 5553, 5555, 5557, 5559, 5561, 5563, 5565, 5567, 5569, 5571, 5573, 5575, 5577, 5579, 5581, 5583, 5585, 5587, 5589, 5591, 5593, 5

armature of the closing magnet is held in its energizing position even though there is no current through the winding of the magnet. The springs B and C then remain in electrical connection until the armature of the opening magnet is drawn up by sending a current through the winding of the magnet.

The current operating the magnets may be furnished by several dry cells connected in a common wire so that the same cells serve for both magnets. The connections of the pairs of push buttons are as shown, and there may be as many combinations as desired. One of the great advantages of the switch is the ease with which the control circuits may be installed, no greater precautions being required than in the ordinary bell circuit. The pair of push buttons located at any point may be painted, one white and the other black, which will serve as an indication for the control of the magnets, the dark one representing an open circuit and the light one the closed circuit.

The construction of the switch is as follows: Two spools are made with iron cores, and heads, or ends, of thin fiber insulation, similar in form and dimensions to the one shown in Fig. 2. One end of each of these spools is tapped to accommodate a $\frac{1}{8}$ -in. machine screw. Wind each of these spools full of No. 26 gauge cotton-covered copper wire, and bring the ends out through the small holes drilled in the fiber ends. A layer of suitable insulating material

in. thick, two pieces, as shown in Fig. 3. These pieces are to form the support for the coils and the armatures, and at the same time serve to complete the

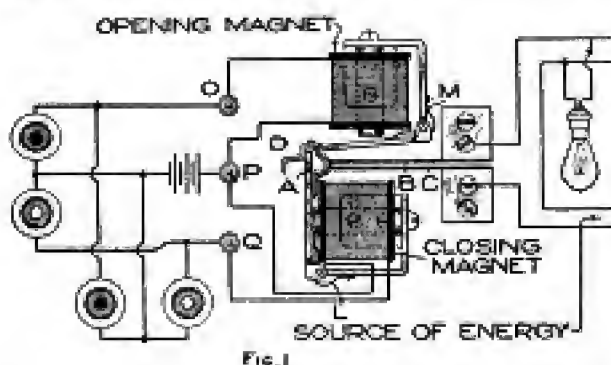


Details of the Parts for Constructing the Switch to be Operated on a Battery Circuit

magnetic circuits of the coils and thus increase their pulling force on the armatures. In each of these pieces three $\frac{1}{8}$ -in. holes are drilled, as shown, and the projections E and F bent up along the dotted lines until they are at right angles to the main part of the piece. The two small projections G and H are to form part of the hinge for the armature, and they should be filed round to make pins $\frac{1}{16}$ in. in diameter.

The two springs indicated by B and C, in Fig. 1, are made from sheet brass, about $\frac{1}{64}$ in. in thickness and cut to the shape shown in Fig. 4. Drill two holes in each piece, $\frac{1}{8}$ in. in diameter, for use in mounting them on a base. There are four slots cut in each piece to form five narrow springs. The ends of these springs to the left of the dotted line J are bent up on one piece, and those on the other piece are bent down, until they are at an angle of 45 deg. to the main part of each piece. The extension below the dotted line K is bent up and down, respectively, for the two pieces.

The armatures should be cut from sheet iron, about $\frac{1}{32}$ in. thick, to the form shown in Fig. 5. The projections are drilled with a $\frac{1}{16}$ -in. drill. Before completing the armatures the coils and springs B and C must be mounted on a suitable base, such as a piece of slate. The location of the parts is shown in



Diagrammatic Arrangement of the Opening and Closing Magnets to Control a Current at a Distance

should be placed outside of each of these spools so as to provide a good mechanical protection. Cut from sheet iron, $\frac{1}{16}$

Fig. 1. A thin piece of brass, $\frac{5}{8}$ in. long and $\frac{1}{4}$ in. wide, is cut and bent to the shape shown at A. This piece is attached to the end of the armature of the closing magnet, but is insulated from it. A very light spring should be attached to the ends of each of the supports for the armatures, as shown at L and M. The strength and shape of these springs should be such that they will hold the armature away from the core of the magnets, regardless of the position in which the switch may be placed. The armature is then mounted in position by bending the two extensions over at right angles to the main part so that they will fit on the two projections G and H shown in Fig. 3.

Rivet a thin piece of sheet brass to the free end of the armature of the opening magnet. This piece is about $\frac{3}{4}$ in. long and $\frac{1}{8}$ in. wide. The armature of the opening magnet is fastened in place by bending the two extensions

over as in the case of the armature of the closing magnet. The opening magnet is mounted in place on the base so that its armature and the piece of brass attached connect as previously described.

The three small terminals O, P, and Q are mounted on the base and the windings connected to them as indicated. The small bolts used in mounting the springs B and C may serve as terminals for the circuit which the switch is to control. A suitable covering, preferably of metal, should be made and fastened in position over the switch in such a manner that it may be easily removed. Holes are drilled through the base near the connecting terminals of the switch, through which the wire may pass and thus not interfere with the cover in any way. Two additional holes are drilled through the base, in a suitable place, through which the mounting screws, or bolts, for the switch may pass.

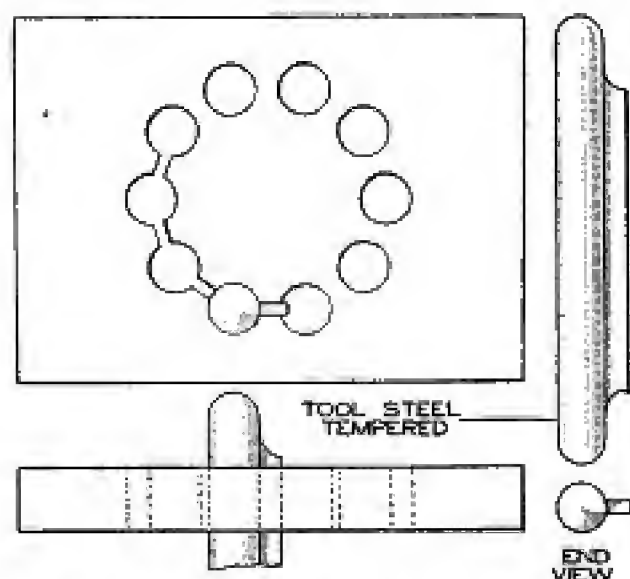
Tool to Remove Stock between Drilled Holes in Dies

In making a die it is often necessary to remove a part of the metal by drilling holes close together on the line of separation, then chiseling out the metal between the holes. The tool illustrated is quite convenient for remov-

ing this metal. It is made of tool steel with the body a sliding fit in the holes drilled; then a side cutter is formed to extend into the next hole with a cutting edge on one end. It is only necessary to drive the tool through the holes.—Contributed by Chas. C. Davies, Washington, D. C.

The Lost Art of Hardening Copper

The hardening of copper by the ancients has never been proven, although many statements have been made to that effect. The supposedly hardened copper implements are made merely of alloys of copper and tin. Often the lost art of hardening copper is bewailed as a real loss to the people of today, but the uses to which hardened copper could be put are not many. Its use for tools is only a myth, for with the price of copper many times that of steel no one would buy the former even if it were as durable. Copper and brass are made much harder, or stiffer, by drawing, pressing, and hammering. Rods, bars, and wire are



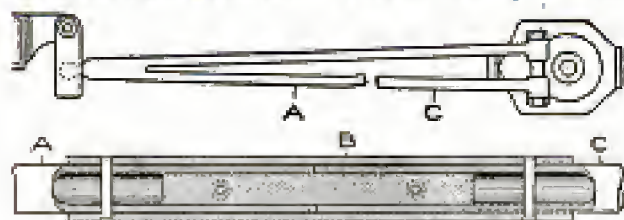
The Extending Part on the Side of the Tool Removes the Metal between the Holes

regularly listed as "soft" and "hard." The term hard, for copper, does not imply a quality to be compared with similarly designated products of the iron and steel trade.

Quite frequently copper may be found that is really hard, so hard that it cannot be filed. In overhauling the canopy switches of trolley-car switches of the jackknife type the contact members have been found to be as hard as glass, sometimes for a length of 1 in. These switches are located over the motorman's head and in conjunction with fuses were, and are still, used on the older-type cars, and smaller ones for the same combined purposes as the circuit breakers with which all modern trolley cars are equipped. Seemingly, the only way to account for the hardened area of the contacts is that the cars had been run with the switches barely closed and that continued arcing had set up a fusion that had produced this result. In all of the cases noted, the blades had not gone so far as to interfere with the working of the switches. In no case had the switches been taken out solely for repairs to them.

Repairing a Torque Rod on an Automobile

A tubular torque rod on an automobile was broken as shown in the sketch. It was repaired as follows: Both sections of the broken rod were removed, and a piece of round drill rod was forced part way into the large portion A, after which an additional piece of tubing, B, was forced over the torque rod on the outside. The other portion

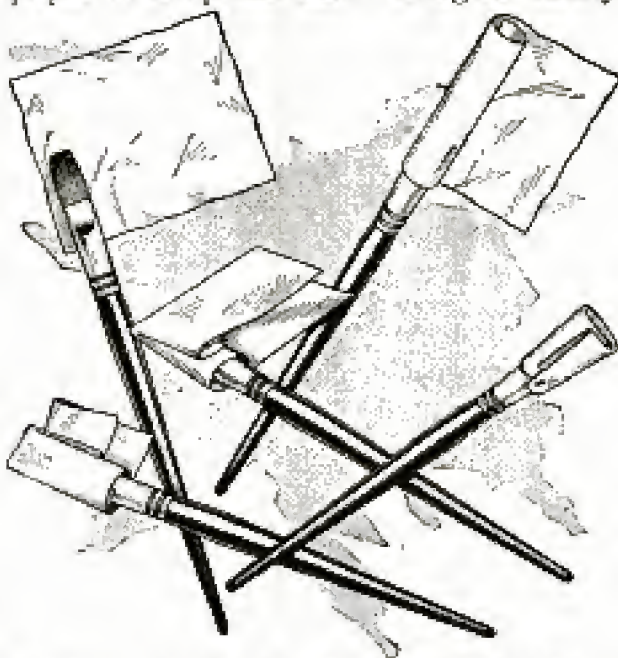


Torque Rod of an Automobile Repaired with a Rod and Tube Riveted in Place

of the torque rod C was then forced into position, and the joint made permanent with four rivets.

The Care of Lettering Brushes

Lettering brushes after being used should be cleaned out and wrapped with paper to keep the hairs straight. Many



Wrapping a Paintbrush without the Use of a String, to Keep the Hairs Straight

painters, when out of a job, wrap the brushes in paper and put them in a pail of oil, the paper keeping the hair straight, and the oil preventing them from hardening. The manner of wrapping the brushes without the use of a string or rubber band is shown in the illustration.—Contributed by Wm. A. Temple, Fort Dodge, Iowa.

Sealing a Box Cover Fastened with Screws

Recently I received a shotgun packed in a pine-wood box, the cover being secured with wood screws and the screw heads set in a counterbore, whereupon the depressions had been filled with sealing wax to prevent tampering with the contents. I have received a great many valuable guns for repairs, and this was the first one placed in a package secured in this manner.—Contributed by M. E. Duggan, Kenosha, Wis.



To Store a Lead Storage Battery When Not in Use

One of two methods is usually employed in putting a storage battery away for the winter, one known as "dry storage," and the other as "wet storage." The condition of the battery and the length of time it is to be out of service are the principal factors governing the selection of the method to be used. If the battery is in good condition and there is no real necessity for dismantling it on account of needed repairs, the wet storage is the preferable method, provided the battery is not to be out of service for more than about twelve months. On the other hand, if the battery is in such condition that repairs are, or soon will be, required, or if it is necessary to store it for more than a year, the dry method is the better.

The battery should be carefully examined, paying particular attention to the condition of the plates, separators, and the amount of sediment in the bottom of the containing jars. If the plates are found in good condition, and there is very little sediment in the bottom of the jars, the battery may be given an equalizing charge, and then placed in storage where it will be free from dust and dirt. The equalizing charge is a low-rate overcharge, continued until there is no increase in specific gravity of the electrolyte in any of the cells. Should the gravity in any of the cells exceed 1.300 during this charge, some of the electrolyte should be drawn off and distilled water added to reduce the gravity. After the electrolyte in all the cells has reached a constant gravity, and no change has been noted for three or four hours, proper corrections being made in the gravity readings for any change in temperature, the charge may be considered complete. The gravity in all the cells should then be adjusted to a value between 1.270 and 1.280 by removing some of the electrolyte and adding water, or 1.300-acid, as may be required. It often happens that only one or two cells may require a prolonged charge, in which case it is al-

ways best to disconnect them from the others and charge them separately.

While the battery is in storage, the loss through evaporation should be replaced periodically by adding pure water so that the plates are covered to a depth of at least $\frac{1}{2}$ in. About every three or four months, the battery should be given a charge, using half the normal finishing rate recommended by the makers, until the cells have gassed continuously for at least three hours. If any of the cells fail to gas, they should be examined and the trouble corrected. If the examination of the battery indicates a poor condition of the plates and a large amount of sediment in the bottom of the jars—it should be at least $\frac{3}{8}$ in. from the lower edge of the plates—it must be dismantled and placed in dry storage as follows: First make a sketch of all the connections and mark all terminals and their polarity. Next remove all connections between cells, and by means of a putty knife, take off the covers. The covers must be thoroughly cleaned by placing them in hot water, which will melt any of the sealing compound adhering to them, and clean off the acid. The hot water will soften the covers, and these, to be kept straight, should be placed in a pile and a weight put on top of them.

The plates are then carefully removed from the jars, and the separators between them taken out by parting the lower ends slightly. The separators are then washed, dried, and tied in bundles.

The positive and negative groups of plates are then separated, which will permit of a more careful examination. When the positive plates show a great deal of wear, they must be scrapped. If not thrown away, all loose particles adhering to them are removed with a smooth paddle. If the active material of the negative plates is swollen beyond the surface of the grid, it should be pressed back into position before the plates dry. This can be done by placing boards of suitable thickness between the plates and clamping them in a vise. The acid is then carefully

poured out of the jars to keep it as clean as possible; then the sediment in the bottom is removed, and the jars are thoroughly washed. The acid is kept, to treat the negative plates. The positive groups of plates are combined in pairs and placed in the jars, and are then ready for the storage.

The negative groups of plates are also placed together in pairs, put in the remaining jars, covered with the acid and allowed to remain about six hours. The acid is then removed and the jars with the plates stored.

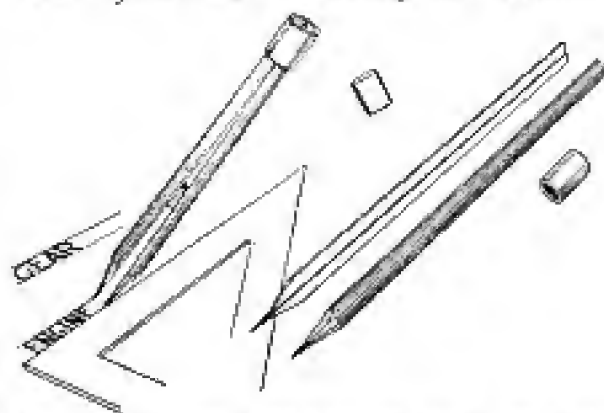
When it is desired to put the battery back in service, the positive and negative groups of plates are reassembled and the separators placed between them. Place the elements in the jars and fill with acid of a specific gravity of 1.250 so that the plates are covered $\frac{1}{2}$ in. Connect the cells in series, and put the battery on charge at the regular finishing rate. After charging for a few minutes, note the voltage of each cell and make a record of these readings. Each cell should record about two volts, and those not showing this voltage are more than likely to be connected backward, which should be remedied. The cells are then closed and the connections made permanent.

When the cells begin to gas freely, the charging rate should be reduced to half the normal finishing rate, or less, if the temperature of the electrolyte exceeds 110 deg. F. Continue the charge until the gravity of all cells has become constant for a continuous period of 10 hours, but do not allow it to exceed 1.300. After the charge is complete, adjust the acid in the cells to a value of 1.270 to 1.280.

A Dual Pencil for Draftsmen

For the draftsman who desires to save time in drawing uniform parallel lines, for lettering and other purposes, the dual pencil shown in the illustration will be found exceedingly useful. It is made by cutting away the sides of two pencils until the lead is just exposed and joining them face to face by means of a ferrule from an old pen-

holder. This ferrule should be short so as to allow the necessary degree of flexibility. If one is not available a tight wrapping of string, or wire, at

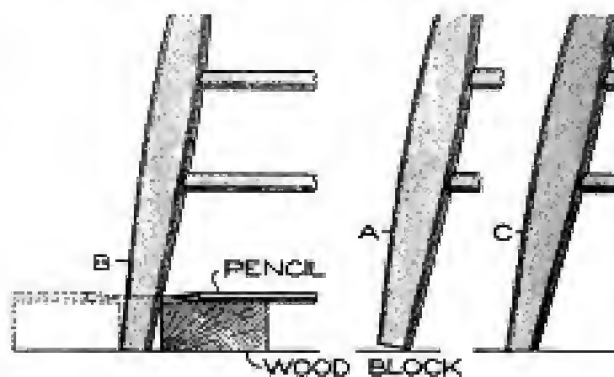


Two Pencils Joined Together with Ferrule on Upper Ends, and Sliding Wedge to Draw Parallel Lines

the top answers the purpose almost as well. A small wood or cardboard wedge inserted between the pencils permits the easy adjustment of the points by sliding it up and down.—Contributed by Morris G. Miller, New Rochelle, N. Y.

To Shorten the Legs of a Chair

Usually when the legs of a chair or stool are sawn off carelessly one, or all of them, will rest on the floor like that shown at A. The cut should always be made parallel with the floor and not with the seat. To insure correctness, place the chair on a level surface and mark each leg all the way around with a pencil resting on a block which is slid around the leg, as shown at B. In this

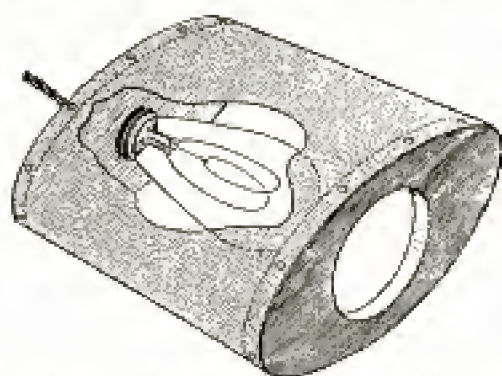


Marking a Chair Leg so That It can be Cut Off to Rest Level on the Floor

manner a proper guide line is made for the saw, and when cut, the leg will rest on the floor, as shown at C.

An Electric Foot Warmer

The hot brick, or slate slab, can be easily supplanted by an electric stove where electrical energy is available. It is only necessary to procure a large

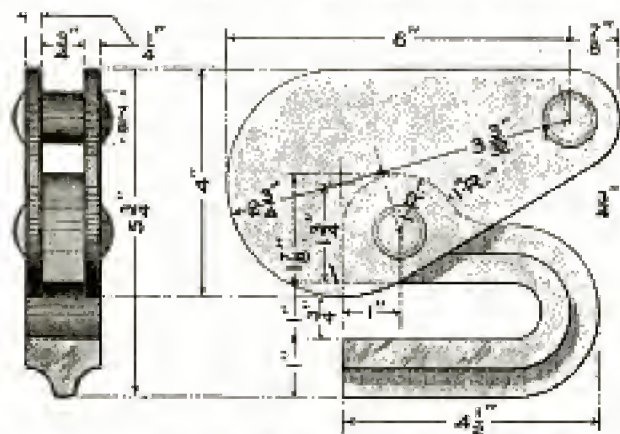


A Large Incandescent Electric Globe Constitutes the Heating Element in the Tin-Can Body

fruit can, about 1-gal. size, and remove both ends, being careful not to disturb the seam where the ends of the body are joined. This part of the can is then pressed into an oval shape and crosspieces of wood are fastened into the open ends. A large-size incandescent electric globe is then introduced in this covering and fastened so it will be in the center. This is connected to a lamp cord with a plug at the opposite end, the cord being long enough to reach and connect with a lamp socket.

Hook for Lifting Metal Plates

Steel plates are usually stored in a horizontal position, and when worked in a press, punch, or shear, they are carried in this position. The illustra-



Hook to Grip the Edge of a Plate for Lifting It with a Crane

tion shows a hook, of which three are used, for lifting each plate with the crane. The opening in the hook part will admit plates up to $\frac{3}{4}$ in. in thickness. A link is attached to the end of the eccentric piece for attaching the chain of the crane. These hooks will grip the metal tightly and there is no danger of dropping the plate.—Contributed by Joseph K. Long, Renovo, Pennsylvania.

Reflecting Stage Scenes on Orchestra Music Racks

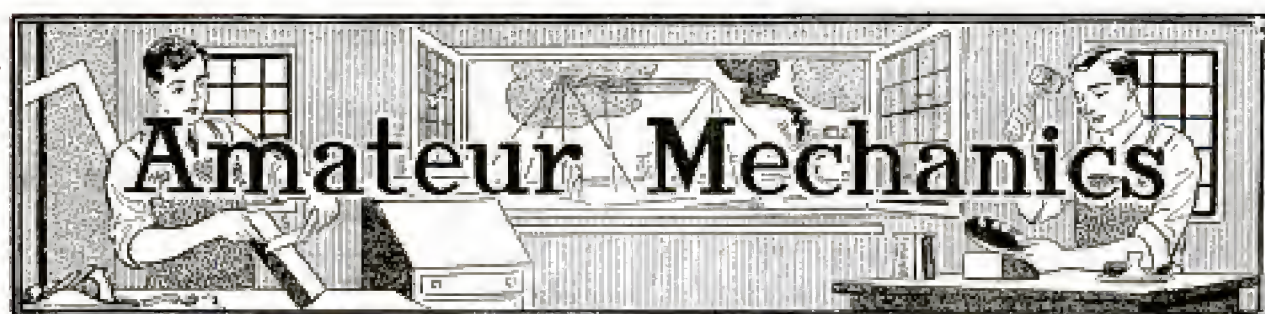
Orchestra leaders and players for moving-picture shows will find it worth while to rig up a set of mirrors to reflect the play on the stage so that it is not necessary to look up. If a large mirror is placed just back of the orchestra, and a smaller mirror set close to the music rack, they will reflect the scene close to where the music is read. The mirrors can be easily set to reflect at the proper angle.—Contributed by Roy Douglas, Terre Haute, Indiana.

An Automobile-License Holder

Almost all states require the driver of an automobile to have a license and to carry it at all times while driving. If this paper is carried in the pocket loosely it will soon become worn or possibly lost. The best way to carry the license is in the small holder used for pencils. Remove the pencil, make the license into a small roll and put it in the holder. Fasten the chain to the key ring, and the license will be ever ready and clean.

Waterproofing a Waxed Finish

A waxed finish may be effectually protected against water, or other form of moisture, by applying the following coating: Zanzibar copal varnish, boiled linseed oil, and spirits of turpentine; six parts of each, by weight. Mix these well together. This protective coating will not affect the appearance of the wax finish or change it in any way.

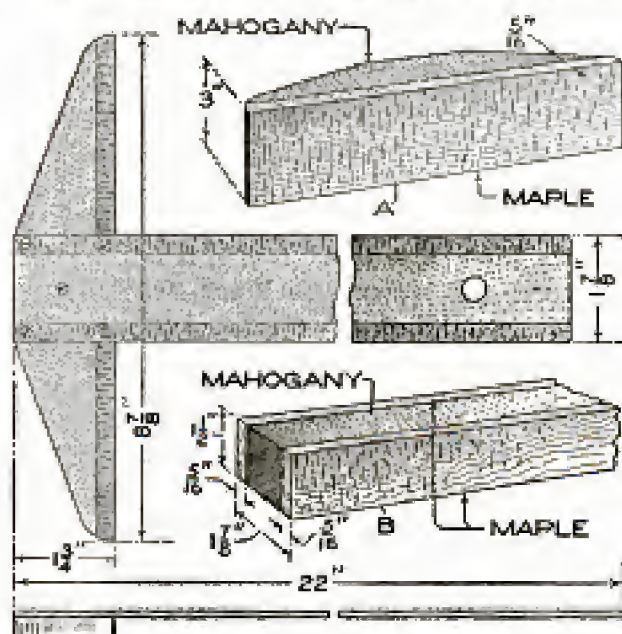


Making T-Squares

By J. B. MURPHY

THE making of a single article of any kind presents a distinct problem in itself, but the production of a large number of the same article must be done in a different way, if efficiency and uniformity in the product are desirable qualities. Taking, for instance, the making of a large number of T-squares, the material is not made up in the same manner as for one. Where a number of these instruments was required, they were made as follows, with no other equipment than bench tools and a band saw. The squares were made of mahogany having both stock and blade edged with maple. The blades were fastened to the stock with five $\frac{3}{8}$ -in. button-head screws.

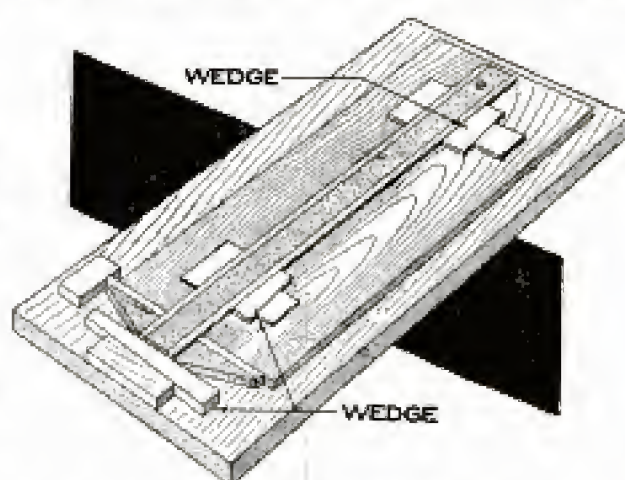
The material for the heads and the



Dimensions for a T-Square of Which a Number were to be Made in Duplicate

blades was glued up and finished to the sizes given at A and B. The material was cut to gauge lines on the band saw, the blades being a scant $\frac{1}{8}$ in. in thick-

ness, and the stocks, $\frac{3}{8}$ in. Two of each were cut from each prepared piece, first from one side and then from



Stock and Blade Material for Making the Parts, and the Jig for Assembling

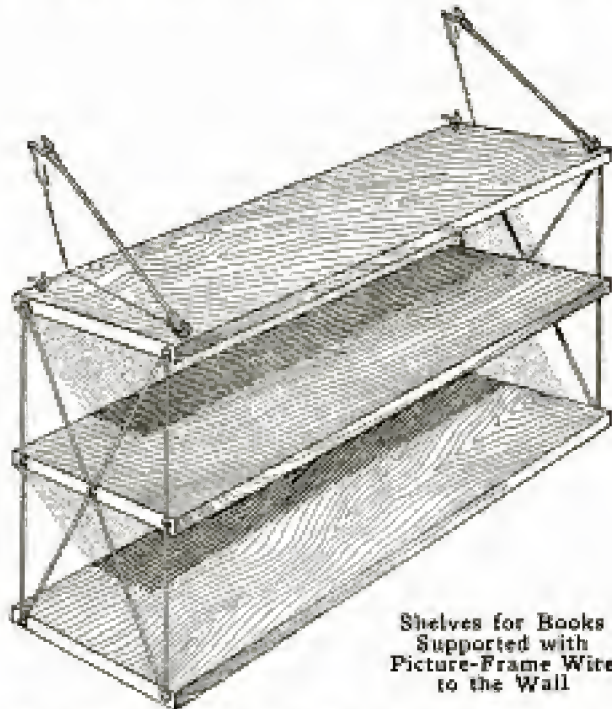
the other. They were then faced off on both sides, and two more pieces cut. With careful cutting, six blades and six stocks were made from each piece. This left one side of each piece to be planed after sawing. The holes for the screws were drilled with a small hand drill.

For assembling, a jig was made by nailing a piece of stock, $\frac{3}{8}$ in. thick, to a straight drawing board. One end of the piece was planed straight and true before it was fastened in place. Stops were provided to locate the stock and hold the blade square with it. Wedges were used to keep both stock and blade against the stops while the screws were inserted. The wedges were not driven with a hammer, but pushed in firmly with the fingers.

Insert a scratch awl in common hard soap for hardening, and it will need no drawing after the plunge.

Easily Constructed Wall Shelves

All that is necessary to make and support the simple set of wall shelves, shown in the illustration, is lumber for



Shelves for Books
Supported with
Picture-Frame Wire
to the Wall

the shelves, four screw eyes, four screw hooks, sufficient picture-frame wire to form the braces and supports, and wood screws for attaching the wire. On the top side of the upper shelf are fastened the four screw eyes, two near the wall edge and the others near the outer edge. To support the upper shelf four screw hooks are used; two placed in the wall and spaced to match the set of screw eyes nearest the wall, the others being placed above the first and connected to the outer set of screw eyes with the wire, thereby forming strong inclined

supports. The remaining shelves can be hung to suit by the supporting wires, which are fastened with screws to the end of each shelf.

Showing the Strength of a Giant

This trick is not so well known as it might be, although for a while it was quite a popular drawing attraction for circus side shows and other amusement places. It is one of the favorite Hindu tricks. The performer passes for examination two pieces of rope 10 ft. long. In one end of each rope a large ring is fastened. Taking a ring in each hand the performer commands three or four men at each end of the rope to take hold of it and at a signal they pull as hard as possible. They pull until they are exhausted as in a tug of war, but the performer only appears a trifle exerted and finds no difficulty in holding the men.

The secret is in the use of a piece of flexible wire, which passes up the right sleeve of the performer, across the back and down the left sleeve, lying just inside of the coat sleeve. At the ends of the wire are small hooks. When about to perform this trick the performer puts on a pair of gloves. The gloves are slit in the palms to allow the hooks to pass through. The hooks are covered with cloth, colored to match the gloves. An essential point to remember in performing the trick is to keep the fingers well around the rings to prevent the ropes from dropping in case of a slack-up on the tension.



The Performer Seems to Hold the Ones Pulling on the Ropes without Any Effort. Producing an Effect That cannot be Readily Understood, and Making an Excellent Trick for the Lawn Party

Barro, Calif

SURFACE MINING FOR GOLD

BY W. M. MILLS

CONDITIONS

Of life are such that opportunities for new experiences and pastimes present themselves continually to the adventuresome person. Even during the short summer vacations, the time set aside for idleness and pleasure may often result in profit combined with pleasure, if surroundings and possibilities are considered. Quite a few people plan their vacations and outings in places and surroundings where they may not only enjoy the rest from their regular labors, but even pay their way as they go from the results of pastime investigations or experiences. New ideas may be the means of eventually getting into more interesting lines of work. People planning their vacations in the mountains, especially in ore-bearing regions, may wisely look around and possibly come across some "find" that may change the rest of their career. In view of such an opportunity, it may be well to give some of the general, yet useful, points in gold mining and the assay, or determination of value, of such ore.

First of all, a prospector's outfit is necessary. In any camping, or out-



PART I—

Panning for Gold

A Regular Camp is Set Up and Then Preliminary Panning is Systematically Followed Out Until Traces of Color are Found; Then the Prospecting Proceeds Upward and Back into the Hills

door living, a simple outfit must be provided if considerable traveling is to be done. Some means of transportation must be figured on; if by stream, then a boat is necessary; if by land, a horse or donkey should be used, unless several members compose the party, in which case each one can share the necessary burden. It is important to figure on emergencies; therefore, even in warm climates, it may be necessary to have

several blankets. If possible a small "A" tent should be taken along. All necessary cooking utensils should be provided, besides a supply of flour, sugar, bacon, salt, baking powder, and coffee, sufficient to last longer than the planned trip. Meat and fish probably can be procured on the trip and need not be taken along. The necessary tools are: Ax, pick, shovel, pan, hammer, three or four rock drills of assorted lengths, blasting powder or dynamite, fuse, and a gun. It sometimes is desirable to assay the gold on the spot, necessitating the assay outfit, mentioned later on.

New discoveries of gold-bearing lands are made from time to time and in unthought-of places. A great deal of valuable ore can be recovered from so-called "tailings," or scrap, of discon-



Separating the Gold and Mercury by Heating the Amalgam in an Iron Retort

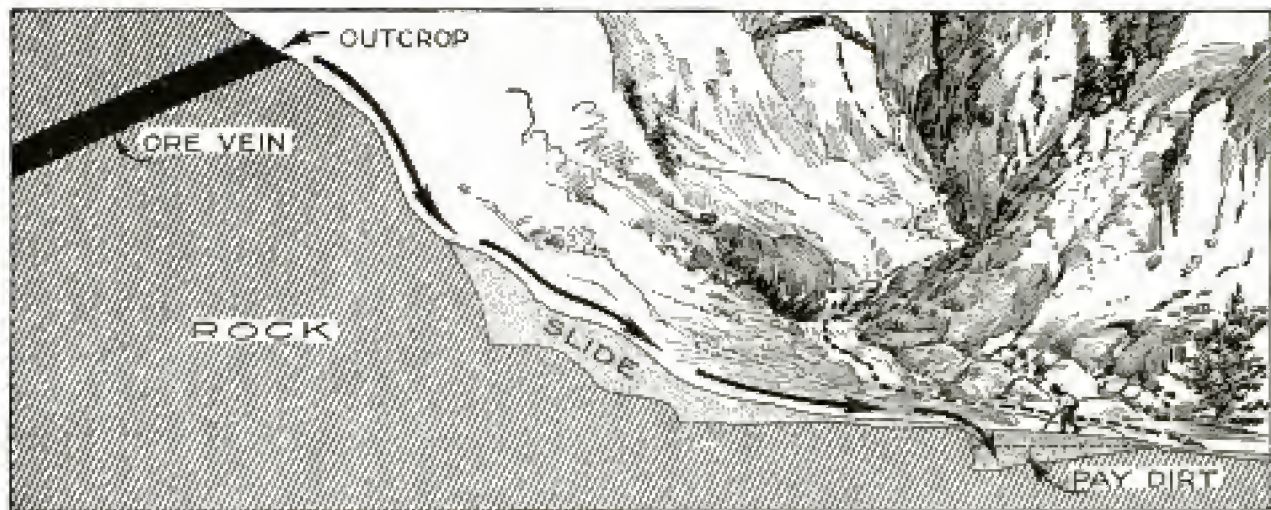
tinued mining properties. In gold mining, especially in "placer," or hydraulic, separation of ore and soil, valuable deposits may still be frequently found around worked-out properties, or entirely new discoveries made. The chances of finding "pay dirt," or gold ore, in a gold country, whether in the hills or on the desert, as in southern California, are best if a regular system of prospecting is followed. This work should begin generally in the lower areas and be followed up through the draws, or cañons, to the hills and mountains. The reason for this is that the gold which was originally in the rocky strata of the mountains, has, through the effect of surface washing, or erosion, been released from the quartz lodes, or ledges, and carried downward by the waters to the lower stretches. Here it has been deposited in past ages, and remains there until discovered.

It is the hope of every miner and prospector to discover a quartz ledge which carries gold. This is usually not accomplished without first having followed up some slight clew of "color," or trace of gold, which may have been found in the low washes, or draws, leading up to the hills. This find of "color," or gold trace, is made by what is known as "panning" the dirt at the bottom of the draws as the prospecting proceeds upward and backward to the hills. Panning, or

horning, is the first and simplest of all the means employed by the prospectors in the search for gold. A pan, about the shape of a frying pan, with sloping sides is the best for this purpose. The dirt to be examined is placed in the pan, and enough water is added to move it freely. The pan is then given a whirling motion, and is slightly tipped so the lighter dirt will wash over the side. This operation is continued until all the fine silt and sand is removed, leaving only the heavy material. The remainder is then carefully examined for "color," or fine gold, by holding it in the bright light and watching it closely, as it takes but very little of the yellow dirt to make the find valuable.

If signs of pay dirt, or color, are discovered, close search should be made for the ledge of quartz from which the color has come. If this ledge is found, it should be examined with great care, both at the surface, or "grass roots," and beneath the surface, for signs of gold. In the southern country, especially in California, these lodes, or ledges, have a tendency to strike nearly north and south. If the searcher has been fortunate enough to find the gold ledge, it is next necessary to assay samples; in other words, to determine the value of the ore. This can be done as explained later on in the article, or if no conveniences and tools are handy, the sample may be sent to a reliable assayer and the exact value of the ore per ton thus determined.

Having discovered a ledge of gold-bearing ore, the next question is that of the expense of mining the ore, sending it to a mill, and separating the gold from the rock. It frequently occurs that a good find, be it of gold or other ore, may be so situated with regard to transportation facilities and necessary supplies for mining operations that the expense of getting the gold is greater than the actual value of the bullion. Necessities, as fuel and water for boiler plants, may render an otherwise valuable ledge worthless for the time being. Usually, in a rough mountain



When Placer Gold is Found, It Is Necessary to Use a Sluice Box and Run the Gravel and Pay Dirt over Riffles to Catch the Gold

country, the lack of facilities for transporting the ore from mine to mill is the greatest obstacle to the development of a mine.

The simplest method of mining gold is through what is known as "placer," or hydraulic, mining on a small scale. It is usually carried on along waterways, rivers or creeks, wherever water is to be had in abundance. Often, however, such mining is found to be profitable along ancient waterways, or in the beds of dried-up streams and in what are known as "river gravels." In the course of the decay and wearing away of the ancient rocks which carried gold, the rivers and streams became natural concentrators, or collectors, by carrying away the lighter portions of the soil and decayed rock, and depositing the gold—which is 19 times heavier than water—in the river bottoms, where it is found at the present time. Gold itself is so indestructible that it will lie in the bed of a stream for ages, and when removed, will still be found the same bright metal it was originally. Placer gold is usually found in nuggets and requires but little refining. The gold being so readily detected in placer mining, this is naturally the most popular way of searching for it. A few nuggets found by placer mining may be worth more than the gold which can be separated from tons of gold-bearing ore. The transportation difficulties are overcome; for, as long as but a small amount need be

carried, no trouble will be found in taking it to the refining mill. Gold, when sought after in placer mining, may usually be found in the lowest part of the river bed, due to its weight being greater than that of gravel. Of any number of assay samples, those taken from above the immediate bed-rock will be found the richest. A placer locality is identified by the accumulation of rounded river stones and boulders, possibly cemented together, and appearing as either a rolling surface or, perhaps, as low, rounded hills. Such gravels may often be covered with a layer of lava which is of later deposit.

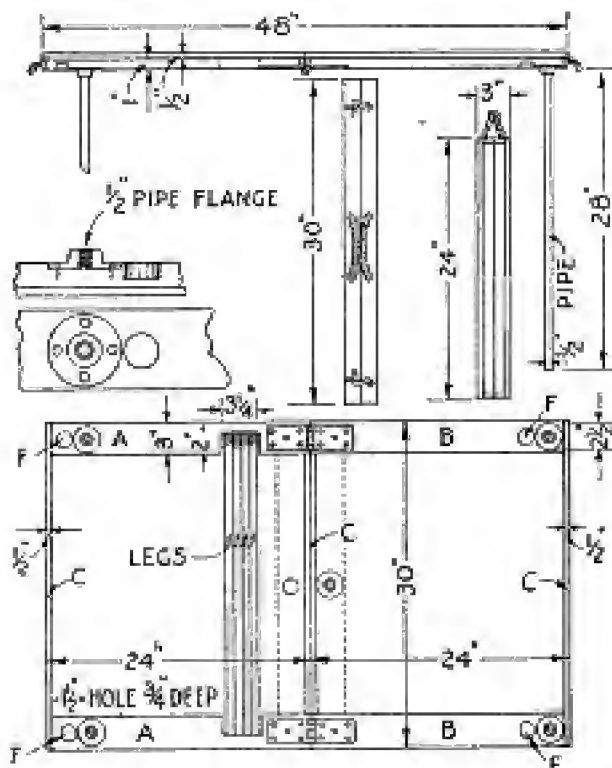
Having located a stream with conditions right for placer work, preliminary panning should be followed until colors are found, and followed up to a find of placer gold. It is then necessary to use a sluice box, and run the pay dirt and gravel over "riffles" to catch the gold. The riffles can be made of various materials; the general idea in their construction is to form some slight obstruction to the passage of the water and gravel in the sluice box. This sudden retarding of the flow will cause the heavy gold to drop down in pockets, or openings, in the riffles. Many different devices are made use of, as the gold may be coarse and in nuggets, or even as fine as flour. As a rule, mercury will assist greatly in catching the valuable ore, since mercury has a very strong affinity for gold

and will readily amalgamate with it. A good illustration of this action can be obtained by placing a gold ring, or other gold article, in mercury; it will immediately amalgamate with the gold, forming a coat of mercury over it, which either must wear off or be removed by heat or chemicals. Valuable deposits of gold are often found mixed with a black iron ore, frequently called "black dirt," which not only tends to prevent amalgamation but, in the preliminary panning, increases the difficulties of discovering the gold. This ore, when found, is usually concentrated, or refined, for its gold-bearing portion and then sent to a refining mill. If the sluice boxes and riffles with mercury pools are used, the gold may frequently be obtained pure by retort-

ing the amalgam. This operation is shown in the illustration. The amalgam is put in an iron retort which is gently heated. The mercury vaporizes and passes out through a tube, connecting the top of the closed retort with a water-filled receptacle, where the vapor is condensed to liquid mercury which may be used over again. The gold can then be easily removed from the retort. After removing the bulk of amalgam from the riffles, the residue may be obtained by burning the riffles, if they are made of reeds, or cloth. Part of the gold will drop out and can be recovered; the remainder is then thoroughly amalgamated and later separated into its parts, gold and mercury, in the retort, as described.

A Portable Folding Camp Table

Camp or lawn tables are usually bunglesome bits of furniture to carry from place to place, and for this reason I constructed one to fold and present the appearance of a thin sample case. When folded it is 30 in. long, 24 in. wide, and 3 in. thick, and as a



The Camp Table When Folded Ready for Carrying Resembles a Tin Sample Case

table it has a top 4 ft. long and 30 in. wide, and is 29½ in. high. The parts necessary, outside of the lumber, are a pair of hinges, four ½-in. pipe flanges, and four pieces of ½-in. pipe, 28 in. long, with threads on one end of each piece.

Two strips of wood, 23 in. long, 3 in. wide, and 1 in. thick, A and B, are connected at each end by strips, 23 in. long, 1 in. wide, and ½ in. thick, C. On these frames are placed the ½-in. thick boards forming the table top. The hinges that join the two parts of the table should be recessed so the table, when folded up, will resemble a thin carrying case. The pipe flanges are placed on the strips A and B in such a way that they will not interfere when the table is closed. On the parts B they may be located touching the outer end strip C. On the other strips, A, they should be placed a distance from the strip C corresponding to one-half the diameter of the entire flange plus one-half the outside diameter of the boss. This will allow the bosses of opposite halves to just clear each other. In fastening to the table, the flanges should be recessed so that only the bosses extend beyond the surface of the wood. Holes, F, should be located and drilled in the strips A and

B, corresponding in position, diameter, and depth to the flange bosses, thus allowing the table to be shut up tight, the bosses fitting into the holes. The strips A are cut out sufficiently so the table legs can be placed in the position shown. Tablecloths, napkins, and other light material, may likewise be carried between the folded parts of the table. Any convenient carrying handle may be provided, and the table locked when closed by means of hooks and staples. Should the table be made to larger proportions requiring extra supports in the center, one or more legs may be added by first putting in crosspieces, shown by the dotted lines, then placing the flanges so they will miss each other and fold into holes bored to receive the bosses as before.—Contributed by F. M. Arnold, St. Elmo, Tenn.

A Durable Pincushion

The pincushion is not merely cheap, but satisfactory in every way for my office desk. It is made of a cake of white soap covered with tissue paper, the paper being fastened neatly in place with pins. Into this I stick the pins that are constantly needed for use at the desk. The pins stick in easily, remain firm and do not rust. The paper can readily be renewed when soiled.—Contributed by L. Alberta Norrell, Marietta, Ga.

To Keep Worms Away from Plants

Old screen wire, or new, can be used to good advantage over plants, such as cabbage and tomatoes, to keep out worms. To use the wire, form it into cones of sufficient size to cover the plant until it gets a hardy growth. In some instances the wire screen has protected plants from the frost. The base of the cone is pushed into the earth about the plant.



Shadowgraph of the Savior

The sketch would appear to be the work of a cubist, but instead it is a shadowgraph which will produce an



In a Strong Light the Paper Cut Out Produces an Excellent Shadowgraph of the Christ

almost perfect representation of the Savior. The exterior lines must be trimmed, the spaces cut out and then held in such a manner that a shadow will be cast. The result will be the face of the Crucified thrown upon the wall.—Contributed by John F. McCune, Ellicottville, N. Y.

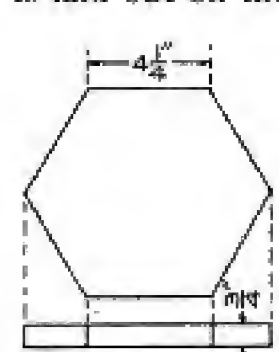
Six-Sided Waste-Paper Basket

To construct the hexagonal waste-basket, shown in the sketch, it is necessary to have the following material:

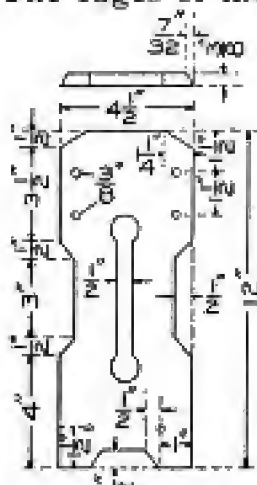
- 6 side pieces, $\frac{3}{4}$ by $4\frac{1}{2}$ by 12 in.
- 1 base, $\frac{3}{4}$ by $8\frac{1}{2}$ by $8\frac{1}{2}$ in.
- 12 round-head wood screws.
- 6 strips of leather lace, about 10 in. long.

The bottom is laid off with a pair of dividers, first drawing a $4\frac{1}{4}$ -in.-radius circle, and then using the same setting to step off around the circle, thereby getting six equal spaces which are connected to form sides each $4\frac{1}{4}$ in. long.

These are then cut and planed to size. The sides are squared up to a size, $4\frac{1}{2}$ in. wide by 12 in. long, and the design is laid out on them. The edges of the

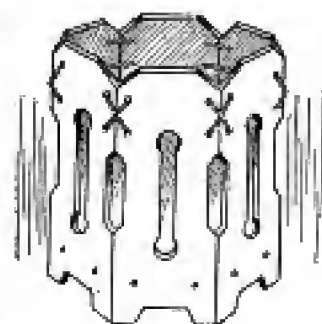


The Sides, Made of Wood, Are All Alike and Tied Together with Leather Thongs



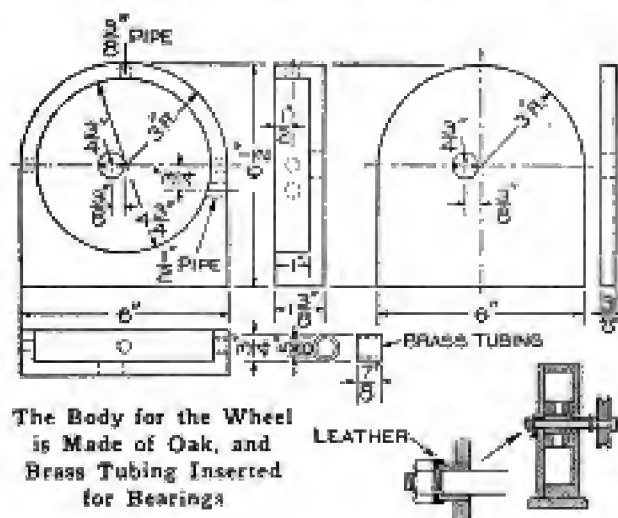
boards are beveled off to fit around the base. A line is drawn on the inner side, $\frac{7}{8}$ in. from the edge and parallel with it. If the board is then trimmed from the outer corner to the line, the correct bevel will be obtained very closely. The

sides are then cut to the design. If no scroll saw is handy, the internal design may be cut out with an auger bit and keyhole saw. After all the pieces have been fitted, they are assembled and fastened to the base with the wood screws. The best finish can be given the basket if it is sandpapered and stained or varnished, as desired, before permanently assembling it. The sides, at the top, are held together by leather laces. Strips of brass, or copper, may be used to good effect instead of the lace. If desired, two metal handles or rings may be fastened to opposite boards with lace or screws.—Contributed by James Gaffney, Chicago.



Homemade Rotary Pump

In order to drive reciprocating pumps from a revolving pulley, a special power head must be provided, equipped with gears, crank, and bearings. Rotary pumps, besides avoiding the necessity of any such arrangement for driving them, are valveless and



The Body for the Wheel is Made of Oak, and Brass Tubing Inserted for Bearings

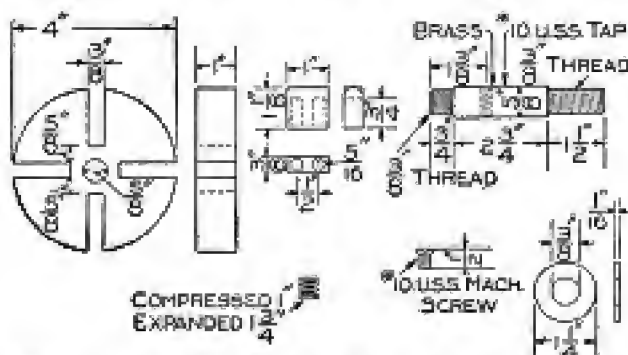
more compact, and therefore especially adapted to confined places and laboratories. The illustrated pump can be

easily made from wood and fittings that are readily obtainable.

For the body of the pump, a piece of sound hard wood, 6 by $6\frac{1}{2}$ in. and $1\frac{3}{8}$ in. thick, should be provided. This is faced off and turned in a lathe, a central hole being cut out, $4\frac{3}{4}$ in. in diameter by 1 in. deep. The center of this recess should be found, and a $\frac{3}{4}$ -in. hole for the bearing laid off and drilled, with its center $\frac{3}{8}$ in. to the left of the recess center, on the horizontal center line of the recess, as shown. A $\frac{3}{8}$ -in. thick cover should be provided, having the same exterior outline, and likewise drilled for a $\frac{3}{4}$ -in. hole. For the inlet connection of the body, a hole should be drilled and tapped for a $\frac{1}{2}$ -in. pipe thread, $\frac{3}{4}$ in. below the center line of the circular recess, and $\frac{1}{2}$ in. in from the open side. An outlet should be drilled and tapped for a $\frac{3}{8}$ -in. pipe connection through the top, and in line with the center of the body. In order to permit all water in the upper part of the pump to escape, a groove should be cut in the circular face, starting at the outlet and passing

down to a point near the horizontal center line of the body.

The rotor, or paddle wheel, consists of a 4-in. circular disk provided with four $\frac{3}{8}$ -in. slots, equally spaced. In these are fitted vanes, or paddles, held in position bearing against the inner circular face of the body, by means of spiral springs. Two $\frac{1}{8}$ -in. holes in each vane serve not only as guides for the springs, but also permit the use of a greater length for the same. The upper edges of the vanes are rounded off to provide an easier sliding movement around the circular face. The rotor is carefully bored to fit a $\frac{5}{8}$ -in. brass shaft, and fastened to it by means of machine screws, fitted through the ends of the slots. Brass bearings for the shaft are tightly fitted into the $\frac{3}{4}$ -in. openings of the body and cover. The shaft is turned down and threaded at each end for $\frac{3}{8}$ -in. standard nuts. Rubber or leather washers, placed over the shaft at each end, are pressed against the bearings by the adjusting nuts, thereby preventing any leakage. The driving pulley is held in place on the long end of the shaft, between the adjusting nut and a locknut. Before assembling the pump, the body is fastened to a suitable base, and all wooden parts are thoroughly shellacked and varnished, inside and out, to prevent the absorption of moisture. In order

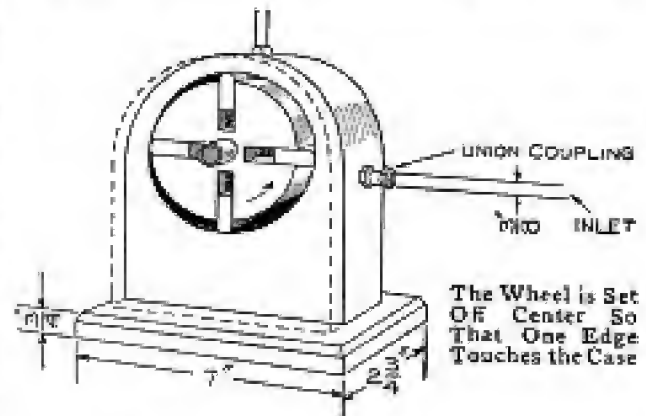


Detail of the Parts for the Wheel Which Consist Mostly of Wood and Brass

to provide a slight end clearance for the rotor, a paper packing ring should be placed between the cover and body when these are fastened together.

In operating the pump, water is forced out continuously by the blades in the upper part of the body. Any

escape from this part, except through the outlet, is prevented on one side by the ascending vane which has last passed the inlet; and on the other side



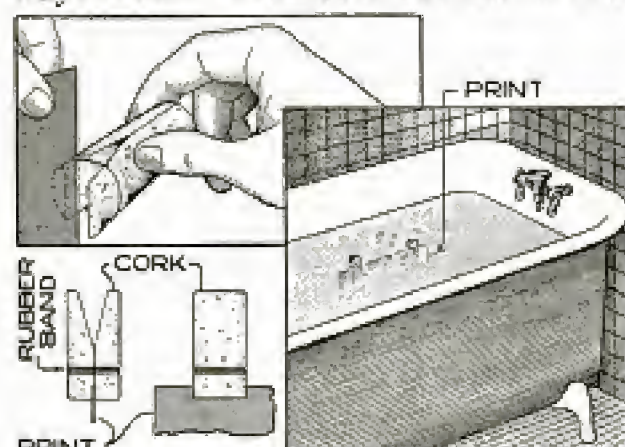
by the sliding contact existing between rotor and body. The vanes in the lower part first produce a slight vacuum until that space connects with the inlet opening, when it fills up with water, which is carried along into the upper section of the pump and there escapes; this cycle of operations is repeated continuously. It is best to have the supply water above the inlet of the pump, insuring its operation, as slight leaks or inaccuracies of rotor and body may admit sufficient air to spoil the vacuum, and prevent the suction of the pump.—Contributed by Adolph Kline, Newark, N. J.

Spout to Drain a Tank Made of Paper

Often one has need for a spout of small size for draining a tank, or some similar use. I had occasion to use one while draining a tank and proceeded to look around for something to serve the purpose. I finally took the cover of a cardboard suit box and rolled it up to make a spout of the desired size. It was then tied with a piece of twine and propped up in the desired position. After draining the tank several times, the water had soaked through a very little bit, only enough to wet the cardboard, but it did not soak through, or drip out, on the sides. I have found that such a spout will last for several hours, working as well at the last as it did at first.—Contributed by Jack F. Meredith, Pittsburgh, Pa.

Washing Bromide Enlargements

The difficulty of washing bromide enlargements of the larger sizes has always made the amateur hesitate to un-



The Cork Clips Hold the Bromide Print in the Water in a Vertical Position

dertake much of this kind of work. The developing and fixing can be done with comparative ease, because of the facility with which the print can be kept moving in a tray that is smaller in size than the print itself, but washing is such a long process that one's patience is exhausted before the hypo is completely eliminated. Continuous handling of a print for 30 minutes is tedious work. This objection can be overcome in the simplest and most efficacious manner, as follows:

Procure some large corks of the best quality and in each cut a groove completely around it, near one end, to serve as a retainer for a rubber band; then cut the cork lengthwise through the center, and cut a wedge-shaped piece from the center toward the end opposite the one where the groove was cut for the rubber band. After placing a band in the groove of the proper size the combination will work similarly to an old-fashioned spring clothespin.

If two of these are snapped on the edge of a bromide print, this can be dropped into a bathtub or laundry tub for washing. The corks will cause the print to float vertically in the running water. By this means a number of prints can be washed at a time without any danger of their sticking together or becoming wrinkled or cracked in the bath.—Contributed by T. B. Lambert, Chicago.

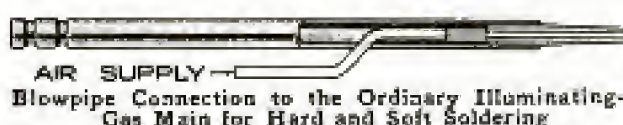
Bench Support for a Miter Box

To make the most effective use of a miter box, it must be fastened solidly to a base, but if fastened to the workbench top it is in the way when not in use, and it is a nuisance to fasten and unfasten the box every time it is used. To avoid the changing, I mounted the miter box on two pieces of 1 by 3-in. stock, about 2 ft. long. These pieces were placed on the bench top, at right angles to the front edge and with their centers as far apart as the two pairs of legs on the box. The box was placed on the front end of the pieces, with the back parallel to the front of the bench, at right angles to the pieces, and was fastened to them with screws. The other end of each piece was fastened to the bench top with a hinge.

This fastened the miter box firmly to the bench top, but in such a way that I could tip it up and back against the wall, or other support, where it was out of the way but ready for use immediately. To stiffen the frame, I placed a cross brace between the two pieces, making it in the form of the letter H.—Contributed by L. C. Burke, Madison, Wisconsin.

A Blowpipe for Gas

Every experimenter who has a gas connection within convenient distance of the workbench should provide a 4 or 5-ft. length of $\frac{1}{4}$ -in. rubber tubing, terminating in a brass tube through which air may be blown in order that a clear blue flame may be available for either hard or soft soldering. The brass tube should be 4 or 5 in. long and fitted at one end with a removable nozzle having a $\frac{1}{16}$ -in. hole in it. A hole is then drilled in the side and a



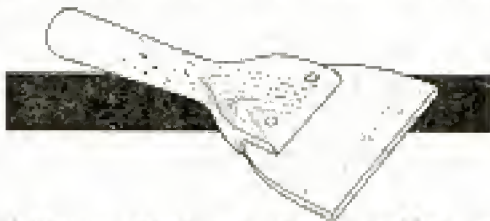
piece of smaller brass tubing, bent as shown in the sketch, is soldered in place for the air supply. A piece of soft-rubber tubing about 1 ft. long is then provided and one end slipped over

the projecting end of the air pipe and the other fitted to a hard-rubber, or amber, mouthpiece. By regulating the gas supply and blowing to the proper degree, a pencil of blue flame may be produced, anywhere from 1 to 4 in. long. For heating large surfaces, the nozzle tip should be removed.

This method of soldering not only makes a better connection than the usual copper, but is instantly available and does not disarrange the several pieces where, as is often the case, it is not practicable to pin or hold them in place.

Scraper for Dishes

Housekeepers will find the scraper shown to be silent and more rapid than a knife for cleaning dishes. It consists of a handle cut from a piece of straight-grained wood, with a kerf sawed in the wide end to a depth of $\frac{3}{4}$ in., into which a piece of sheet rubber is inserted. The rubber may be cut from an old bicycle-tire casing and is fastened with two or three brads driven through the handle. The ends of the brads are bent over or riveted.



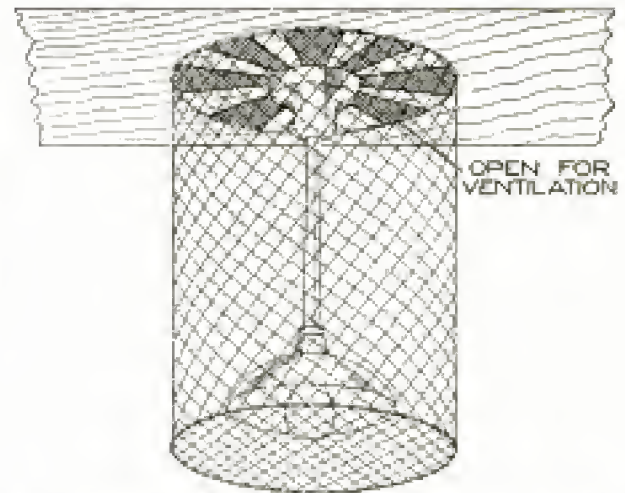
A Dish Scraper Made of a Piece of Rubber Inserted in a Wood Handle

The edge of the rubber should be made straight.—Contributed by H. S. Craig, Rushford, Minn.

Protecting Lights in a Gymnasium

A public-school auditorium was used for playing basket ball, and the lights were protected as shown. Wire wastebaskets were fastened to pieces of board, which in turn were nailed to the ceiling around each lamp. As it was desired to provide a way to ventilate the room, an opening was cut in each board around the lamp base, providing fan-shaped cut-outs covered with galvanized metal of the same design, to

make a way to open and shut the ventilator. The air passed up into an attic. The goals, which were old black-

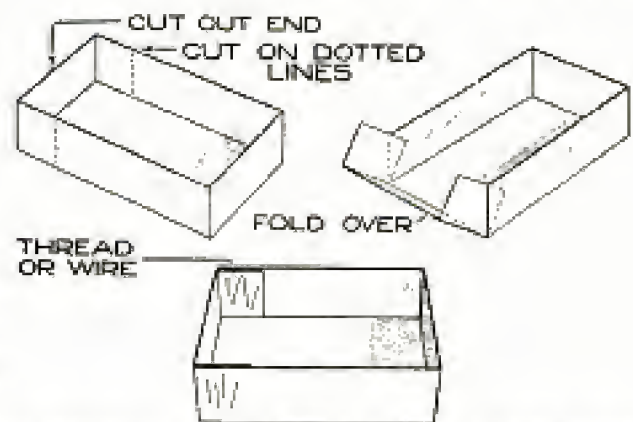


Wire Wastebasket Fastened around a Light to Protect It for Basket-Ball Games

boards, were fastened between the posts that supported the ceiling. Two iron rods, one above the other, were clamped with bolts to the posts, and the boards were bolted to the rods.—Contributed by Frank C. Svacha, McKees Rocks, Pa.

Shortening a Pasteboard Box

If a pasteboard box happens to be too long for a special purpose it can be shortened as shown. The sides are cut down to the bottom and the end removed. The bottom is then bent up on a line between the places where the



Shortening a Box by Bending Up the Bottom after Removing the End and Cutting Down the Sides

sides were cut down, to form a new end for the box. The joining parts are then held with a thread or wire fasteners.

Am. M.
Vill. p. 885

Paddling Your Own Canoe

by
Stillman Taylor



PART II—The Knack of Handling the Paddle

THE knack of paddling a canoe as the majority of amateurs paddle is quickly learned, but to handle a paddle as the expert woodsman and the Indian wield it requires not a little practice and experience. In the birch-bark and canvas-covered craft, used by the guides of Maine and Canada, there are no seats, and the stern paddler kneels with his back against the rear thwart, while the bow paddler usually kneels with his back against the second thwart from the bow. However, the builders of modern canoes furnish a seat for each paddler, and while it is more comfortable to use them, it is better to take the kneeling position, which brings the weight lower in the canoe, as it is safer, and the paddler is better able to control his craft. Again, the use of the seat makes it impossible for the paddler to put much of his body into the stroke, and he propels the craft largely through the muscles of his arms and shoulders. But when paddling from the knees they are spread out to brace the body firmly, and the back resting against the thwart enables the paddler to use his back and thigh muscles to drive his craft ahead with much less exertion and waste of energy than when sitting erect. Of course, the kneeling position is a source of discomfort at first, but after a little practice it will be easy to keep the position for several hours.

The stroke of the paddle is made with the body motionless, one hand grasping the shaft of the paddle and the other holding it a short distance above the blade. The paddle is now carried forward, dipped into the water in front, Fig. 1, A and B, and carried downward past the paddler's body, Fig. 2, A and B, and the stroke is finished in the rear, Fig. 3, A and B. The paddle is recovered by turning the wrist so that the blade is turned edgewise as it is swung through the air to begin the second stroke. The swing of the paddle should be smooth from the beginning to the finish of the stroke, that is, free from undue jerkiness, but the long and slow sweep of the paddle is amateurish, pure and simple. The canoe men of the North woods do not use this stroke, but prefer a shorter stroke, quick recovery of the blade, and the "accent" of the stroke is much the same as that the expert axman uses when felling a tree. Therefore one's energy should be concentrated upon the first part of the stroke, easing up quickly as soon as the blade is opposite the body, and finishing the stroke smartly as it is carried backward. The driving power of the paddle diminishes rapidly as the blade is carried backward, and if the full force of the stroke is continued with a long backward sweep, a way of most amateurs, much energy is wasted, since it adds nothing to the forward momentum

of the canoe, but rather retards it, by forcing down the stern, and also causes the craft to drag more water after it. For a short afternoon paddle almost any kind of a stroke will suffice to drive the canoe ahead, but upon long trips, or when head winds and rough water are encountered, the quick, short stroke will save both time and muscle. The long sweeping stroke of the summer



FIG. 1-A

idler will probably average about 25 to 30 strokes per minute, while the North-woods guide and Indian will dip their blades almost twice as often, a fair cruising average being about 45 strokes per minute. Short strokes, with the accent at the beginning of the stroke, will push the canoe faster and with less effort, and the paddler has better control over his craft.

The bow paddler usually does nothing more than keep up a regular stroke and watch for rocks and obstructions, but if he is a good hand at the paddle he can do much to steer the canoe. For example, take the usual bow stroke, made by dipping the paddle quite close and ahead of the canoe. The force of the stroke thus made forces the bow in the opposite direction, and the man in the stern will be called upon to use more energy in steering. In contrast to this faulty handling of the paddle, the experienced bowman will begin his stroke by dipping his pad-

dle well out from the bow and pulling it toward him at a greater angle, which keeps the canoe moving straight ahead without swinging to one side, and the energy of both paddlers is used in driving the craft steadily ahead. When paddling in tortuous and rocky streams it is the bow paddler's duty to watch out for rocks and snags, and he should always be prepared to "draw" the canoe whenever it is necessary to clear an obstruction or assist the stern paddler to shoot the canoe around an abrupt bend. To do this is simple enough, since in "drawing," the man at the bow merely

reaches his paddle out at arm's length over the side and pulls the bow in that direction, while the stern paddler simply paddles straight ahead.

The stern paddler is the helmsman of the canoe, and while he can keep his craft on a straight course by



FIG. 2-A



FIG. 3-A



FIG. 1-B



FIG. 2-B

The Stroke of the Paddle is Made with the Body Motionless. One Hand Grasping the Shaft of the Paddle and the Other Holding It a Short Distance above the Blade



FIG. 3-B

trailing his paddle at the end of each stroke and using it like a rudder, it can only be done when a long, slow stroke is used. To save time and muscle, the experienced stern paddler always finishes his stroke with an outward push and a turn of the wrist, which offsets the swing of the bow and keeps the canoe on a straight course with much less effort than when trailing the paddle astern. Paddling from the stern is often considered difficult, but one soon masters it by a little experience.

Paddling in Open and White Water

When traveling in the open waters of large lakes where heavy winds and seas are commonly encountered, paddling should always be done on the knees, and the canoeist's own experience and judgment must be called upon to meet constantly changing conditions of the wind and water. To cross a broad stretch of wind-swept water where whitecaps are running high, means a long, hard fight, and the stern paddler must be ever alert to ease the canoe through breaking crests and shift his balance whenever the necessity arises. When paddling in rough water, many canoeists make the mistake of driving their craft too hard, consequently the canoe will "pound" when it reaches the trough of the sea, and much unnecessary spray is sent flying aboard. Of course, in rough water some spray is certain to come over the rail, but if the craft is well balanced by stowing the camp duffle so that the canoe floats on



Dangerous for the Novice,
but Experts Win Races
in This Position

an even keel, it will, with proper handling, weather a pretty stiff gale.

When paddling against a heavy sea and wind, the regular stroke must be altered and modified, and the man in the stern may often balance his craft by holding his paddle in the water while a particular high comber sweeps by. Short and clean strokes are essential for handling the canoe in a heavy sea, and while the skillful canoeist can handle his craft in the trough of the sea when the need arises, it is hazardous for the novice to attempt it. In heavy weather, it is a good thing to keep one paddle in the water while the other is in the air, hence the experienced canoeist will—unconsciously perhaps—alternate or "split" strokes with his bowman.

To paddle, head on, into heavy seas is slow and tiresome work, and most canoeists find it easier to take the seas on the quarter, and the stern paddler must be ever on the lookout, nursing his craft over the big ones and often turning his bow into the largest combers. To be sure, the canoe will plunge more or less and yaw about, but the stern paddler merely checks this side spin, since he cannot prevent it entirely and drive his craft onward at the same time. When running before the wind, it is only necessary to keep the canoe balanced or "trimmed" to keep things dry. Here the bow paddler has the best of it; his sole duty is to keep paddling steadily ahead, while the balancing and handling of the canoe rests with the man in the stern. This point is well worth remembering, for to keep the canoe right side up when shooting rapids or when bucking heavy seas on a lake, the bow paddler must stick to his seat. He can, from his position in the bow, quickly note rocks or other obstructions and pass the word to his partner, who from his point of advantage can likewise better size up the effect of a high wave upon the craft. Probably more capsizes have resulted through the bowman's mistaken efforts to balance the canoe by leaning to one side, or attempting to dodge the spray in rough-water paddling, than through the inability of the stern paddler to handle his craft.

Running a rapid stream in a canoe is replete with excitement, but it is likewise a dangerous bit of fun for the inexperienced canoeist who has not fully mastered the handling of his craft. When running rapids where the water is fairly deep, the use of the paddle is the better way, providing both paddlers kneel in the bottom of the canoe. Unknown streams are naturally the most dangerous, although the veteran canoeist can "size" up the character of the stream at the first glance, that is, the trained eye of the woodsman will read the bottom of the river by the indications on the surface; depth of water, strength of current, swirl caused by submerged rocks, and many other de-

tails are evident to him. To the novice these signs mean but little. If the current flow is from three to four miles per hour, rocks or submerged logs, 4 or 5 in. below the surface, will show very little, but in a 10-mile or swifter current obstructions 12 or even 18 in. below the surface will throw up swirling ripples, and in a very rocky stream with much water flowing, rocks 3 or 4 ft. below will throw up waves of good size. Again, waves are caused by swift water striking the comparatively quiet water of a deep pool and the canoeist should be able to determine the difference between them in order to know what part of the stretch is dangerous and that which may be run in safety.

The waves in a rapid stream are altogether unlike the rolling waves of the open lake, in that the crests follow one another closely and the canoe cannot rise, but plunges through the curling crests. Rocks on the surface are easily avoided, as they split the current, and it is only necessary to steer the craft to one side to pass them safely. The one chief thing to do when shooting the rapids is to keep the canoe on an even keel and the bow into the current, and when it is necessary to change channels, the craft must be shot diagonally across the fast water. To keep the canoe under perfect control in white water, it must be propelled faster than the current flows, and the force of the stream must not strike one side of the bow with greater force than it exerts on the other side. When a canoe swings around in the current, the power of the paddles will be unable to cope with the more powerful current, which quickly swings it broadside and one is struggling in the water in the next instant.

On a long canoe trip where much rapid water must be run, a "setting pole" should be reckoned a necessity. The pole may be a stout sapling, 10 ft. long, cut by the stream side, but an iron shoe, or spike, about 3 in. long, with an iron band or ferrule, should be carried in the kit, the iron spike being simply driven in the end of the green pole. The pole may be used to good advantage when running down shallow rapids, the

man in the bow kneeling and using his paddle to help steer while his partner stands in the stern and wields the pole.



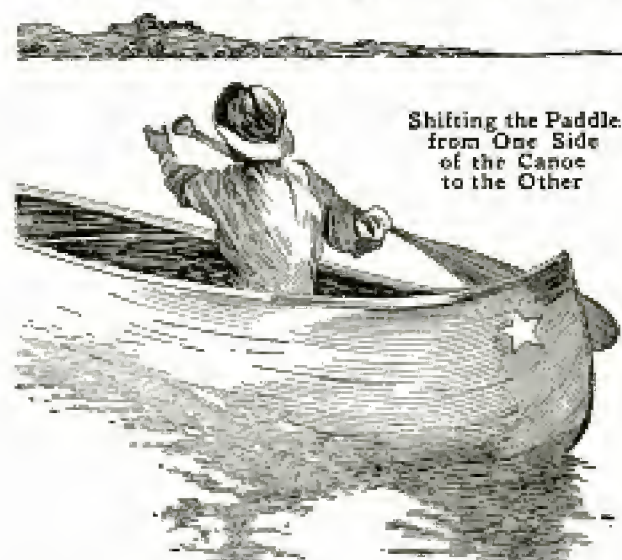
The Double Blade Is Often Useful When Paddling Single-Handed on a Broad Reach of Wind-Swept Water

When traveling up shallow and swift streams, the setting pole is absolutely necessary, and while at first it is an awkward implement to handle, a little practice will enable the canoeist to pole his craft with very little more effort than is required to paddle it. The use of the pole necessitates a standing position, but this is neither risky nor difficult for any canoeist who understands the knack of balancing a canoe, and none but an experienced canoeist has any business in swift, white water. The setting pole is gripped with the left hand near the top, with the right hand held stationary about 2 ft. lower, and as the canoe travels past the pole, firmly planted on the river bottom, the poler leans forward and makes use of his weight and strength to give a quick push. The pole is again shoved forward as quickly as possible, that the craft may lose as little headway as possible, and a new grip secured for the next push. After a little experience with the pole, the canoeist will find it an easy matter to swing his craft across the current and avoid rocks and other obstructions as easily as when paddling. When contemplating a long trip up a stream where the water is heavy and the current swift, the use of two poles will make the work easier. Both persons should pole from the

same side, the man in the bow doing the steering while the stern man adds his straight-ahead push to force the canoe upstream.

The Track Line

The average wilderness stream of the North has enough "tight" places which



Shifting the Paddle
from One Side
of the Canoe
to the Other

judgment tells the traveler to avoid by making a detour by land rather than risk a capsize and a possible loss of the outfit. To "tote" the outfit overland means more or less hard work, and as every canoeist will avoid portaging if there is a fair chance of getting the canoe through a bad stretch of water, the tracking line will come in handy very often. The usual ring in the bow of the canoe is far too flimsy for hauling the loaded craft, and sufficient length of stout rope should be carried along to pass through the painter eye, and then carried aft and half-hitched to the first and second thwarts. One man can pull the canoe up a swift stream by walking along the bank while his partner takes up the opposite side and steers the craft away from rocks by using a stern line. With a heavily loaded canoe in very swift and shallow water, both men must often wade, and a tump line rigged up as a breast or shoulder strap will make it easier work for the man at the bow line.

Paddling a Canoe Single-Handed

The open, or Canadian-model, canoe is, of course, handled more easily and

with better speed with two paddlers, but there are occasions when the canoe is used single-handed. When out for a few hours' paddle, the canoeist usually balances the craft by sitting on the bow seat—or kneels on the bottom with his back against the bow-seat brace—and using the stern for the bow. This brings the paddler's weight nearer the center and keeps the canoe better balanced than when paddling from the stern with the bow high in the air. However, when the canoe is loaded, many canoeists stow their camp duffle forward and paddle from the stern, the weight of the outfit keeping the craft on an even keel. This answers well enough for smooth-water going, but when the water is rough, or a stretch of rapids is run single-handed, the stern position is by no means a good one, since the craft is more difficult to control, and much more strength is required to drive it forward. The Indian manner of paddling a canoe alone is the only correct one, for he always sits amidships—kneeling in the center—and if a load is carried, it is placed in front and back of him so that the craft is balanced on an even keel. Consequently the canoe draws less water and can be paddled faster with the same effort, while the paddler has the craft under perfect control. But the experienced line paddler does not kneel in the center, he moves out until his body is close to the gunwale. This makes the craft heel at a decided angle, it is true, but this position makes for better speed, because it enables the paddle to be held almost vertical, and the more nearly perpendicular the paddle is swung the more efficient will be the stroke.

In using the double blade, the paddler dips first on one side, then on the other, and to make the blades travel through the air with the least resistance, it is customary to set them at right angles to each other. The motion is really a push and pull, the shaft of the paddle being rotated in the hands so that the blade will enter the water with the full breadth facing the canoeist. Rubber cups, to catch the drip as the paddle rises in the air when making

the stroke, are sometimes used by novices, but these are unnecessary if the paddles are set at right angles, and the paddler will bend his wrist a trifle to throw the drip ahead and to one side. At the beginning, the novice will very likely throw a little water in the canoe, but a little practice will soon master the knack.

Care and Repair of the Canoe

The canvas-covered cedar canoe will stand a vast amount of hard service, but it should not be dragged over the ground or over the boarding of the landing float, neither should it be so placed that any strain will come amidships while the ends are well supported. When storing for the winter, keep it under cover, resting bottom side down on a floor, or turn it bottom side up and support it with boxes, or other standards, at the center as well as at the ends. While unused at the camp, turn it bottom side up on the bank. Birch bark must be kept out of the sun, and the paint of canvas-covered canoes will last longer if kept in the shade. When the paint becomes rough, sandpaper it down smooth, and give it a couple of coats of canoe paint. When the paint is worn off and exposes the canvas, give the bare cloth a couple of coats of shellac before painting.

Oiling Tool for Clocks

Jewelers use a little tool for oiling clocks and watches that could be used profitably by others for the same and similar work. It consists of a steel wire, bluntly pointed on the end and set into a wood handle. Very often the only thing that is the matter with a clock which does not keep good time, is that it is dirty and dry. If this is the case, any person handy with tools can fix it at practically no cost. Remove the works, which are usually held with four screws, from the case, immerse them in kerosene and allow them to stand for a few minutes, then remove and drain. This will clean out the dirt.

The oiling tool is dipped in light oil

A repair kit should be taken along on all long trips, consisting of a small can of white lead, a can of orange shel-



Paddling should be Done on the Knees When Traveling Where High Winds and Seas are Encountered

lac, and a sheet of oiled silk. For small cuts in the canvas, a coat or two of shellac will suffice, but for bad gashes, cut off the loose threads of canvas and rub on a little white lead under the raised portion near the hole and on the surface, cut a patch of the oiled silk to cover it, and paste it in position. When the lead is dry, give it a couple of coats of shellac. For making quick repairs, a roll of electrician's tape will come in handy. The birch canoe is quickly repaired in the same manner as suggested for the canvas-covered craft, and as the shellac is waterproof and dries quickly, all ordinary repairs may be made by the stream side with but little loss of time.

and a drop applied to each bearing. Replace the works in the case and the job is finished. A reliable jeweler will charge very little for this work, but the more crafty ones may ask a good price for this "mysterious" process. If the works are not dirty, apply the oil with the tool. Anyone who has tried to oil a clock with an ordinary spout oilcan



The Tool will Pick Up a Drop of Oil and Deposit It Where Wanted

knows the futility of the attempt. The object of the tool is to pick up and carry a drop of oil and deposit it where wanted. A can, a feather, or a match will do, but any one of them is apt to carry dirt, flood the dry part, or smear up nonmoving parts.

INTERESTING NEW PATENTS

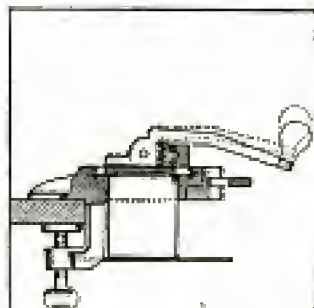


Fig. 1

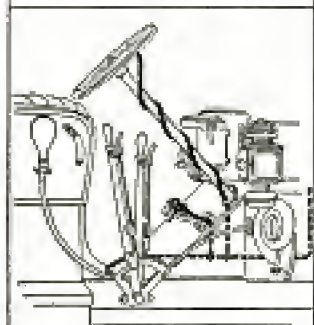


Fig. 3



Fig. 5

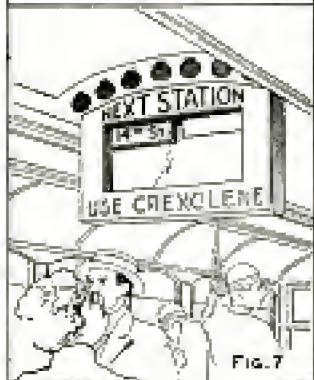


Fig. 7



Fig. 9

CAN OPENER (Fig. 1)—One of the features of this can opener is that it may be clamped in fixed position to the edge of the table. It is equipped with two jaws for holding the can, one of these jaws being movable so that any size of can is easily clamped in place. Working over the jaws is a rotating head operated by a handle, and mounted in this head is an adjustable knife for cutting the tin. In using, the knife is adjusted to the can and is sunk into the tin by depressing the handle. The head is then rotated, with the result that the top of the can is cut out.

ROTATING LAWN SWING (Fig. 2)—The platform is mounted to swing free on a stationary shaft, at the top of which is a table and circular handrail. The passengers rotate the platform simply by pulling on the handrail. The table and handrail are provided with a clutch with which they are fixed to the shaft.

SAFETY ATTACHMENT FOR AUTOMOBILE (Fig. 3)—The object of this invention is to make it impossible for the car to move unless the driver is in his seat with his hands on the steering wheel and with the pedals depressed. This is accomplished by a series of circuit breakers that control the ignition. The car cannot be cranked or the self-starter operated unless the speed lever is in neutral position.

ILLUMINATED NOTE PAD (Fig. 4)—Mounted on the end of the pad is a cylindrical case carrying a small electric lamp for illuminating the paper, current being supplied by a battery placed within the case. The light is turned off and on by means of a push button.

CRUTCH WITH BALL-BEARING TOP (Fig. 5)—The top of the crutch is made up of two metal segments between which are $\frac{1}{8}$ -in. steel balls. With this antifriction bearing the top segment moves freely, adjusting itself to the changing angles of the crutch so that there is little or no wear on the clothing.

NEW TYPE OF ATOMIZER (Fig. 6)—It is the evident purpose of this invention to provide a durable substitute for the rubber bulb commonly used with atomizers. The principal feature of the device is an air pump mounted in the chamber containing the liquid. The pump is equipped with a coil spring that returns it automatically to its original position each time it is released.

STREET INDICATOR FOR ELEVATED AND STREET-RAILWAY CARS (Fig. 7)—This indicator consists of a case in which are mounted a series of pivoted shutters bearing the names of the stations or streets in their proper order. The shutters are all carried on the same pivot, the arrangement being such that when a shutter drops, swinging into the receptacle at the side of the case, it uncovers the shutter bearing the name of the next station or street. The shutters are released electrically by push buttons placed in convenient reach of the motorman. When the car reaches the end of the line all the shutters are returned to their original position by means of a lever at the bottom of the case.

NEW DRIVE FOR CAMSHAFT (Fig. 8)—Mounted on the end of the camshaft is a mechanical device having four radial slots and known as the Maltese cross. Pins carried on the flywheel of the engine engage the slots in succession and rotate the camshaft at the required intervals.

KNIFE SHARPENER (Fig. 9)—The sharpener is operated by the handles, which are worked like the handles of a pair of shears. One of the handles is rigidly fixed to the frame, while the other is pivoted and drives the sharpening disk through a crankshaft and gearing.

HOLDER FOR PHONOGRAPH NEEDLES (Fig. 10)—This device consists simply of a strip of permeable material in which the needles are stuck

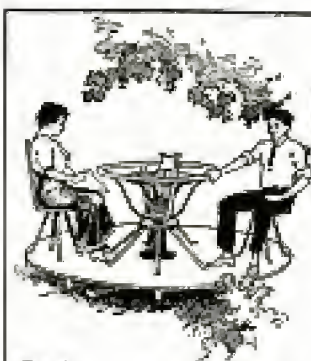


Fig. 2



Fig. 4

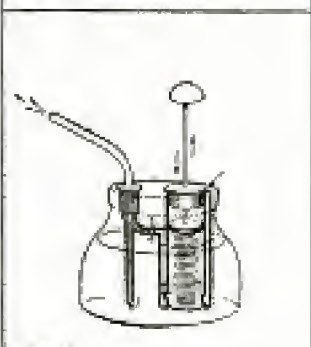


Fig. 6

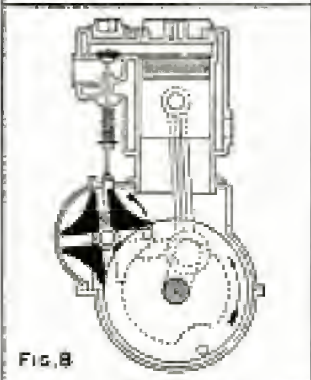


Fig. 8

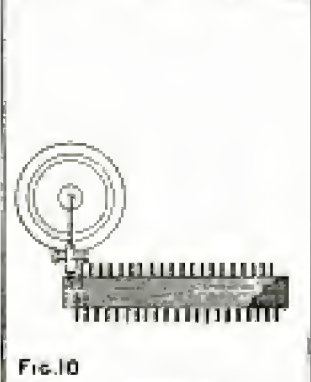


Fig. 10

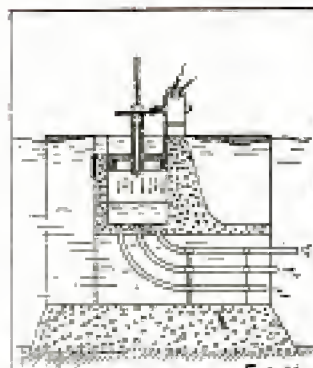


Fig. 11

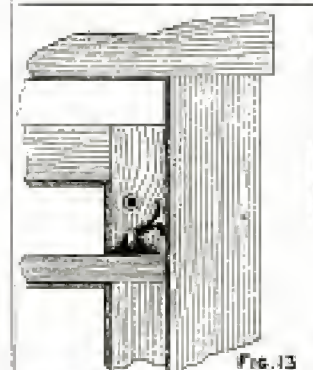


Fig. 13

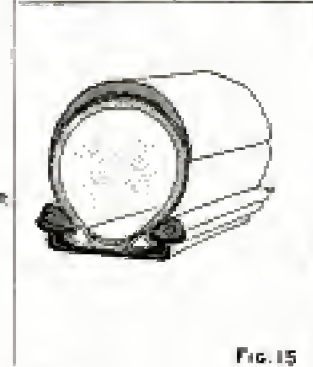


Fig. 15

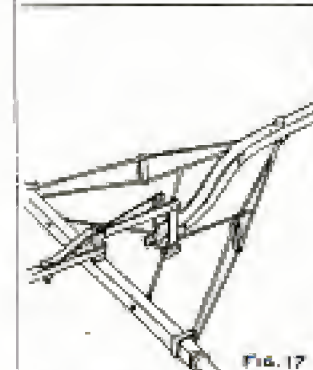


Fig. 17

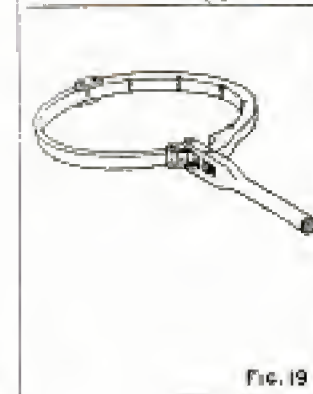


Fig. 19

point first. The needles are spaced such a distance apart that they can be inserted in the needle holder of the sound box without being touched by the hand.

CURRENT MOTOR (Fig. 11)—This motor, designed to be installed in a river current or tideway, consists of a turbine working on a vertical axis and mounted in a casing that is entirely closed except for openings through which the water enters and leaves. The entire apparatus is placed below the surface of the water and the turbine is protected from floating debris by a perforated horizontal plate. The water enters through the perforations, passes through the turbine and then out through pipes leading downstream.

PARACHUTE ATTACHMENT FOR AEROPLANE (Fig. 12)—Two parachutes, one on each side of the vertical axis of the machine, are attached to a series of rods mounted on the top plane and are so arranged that they are held in folded position when not in use. They are released by a lever or other control. The parachutes have sliding connections with the rods and are provided with springs so that they expand quickly when released.

WINDOW LOCK (Fig. 13)—This lock, which is intended to be mounted on the top of the lower sash, has a pivoted arm provided with a saw-tooth face which prevents the sash from being raised when the latch is in operative position. Passing through the body of the lock is a plunger designed to engage sockets in the upper sash and lock the two sashes together.

ROLLER FOR EXPANDING FABRICS (Fig. 14)—This device consists of three rollers working on a bent shaft, and is designed for taking wrinkles and puckers out of a piece of fabric by stretching it transversely. The rollers are mounted on ball bearings and are made to work in unison by intermeshing teeth formed at the ends.

CUSHION RIM FOR AUTOMOBILE (Fig. 15)—A rubber ring is stretched around the wheel on each edge of the rim in such position as to give support to the sides of the tire and keep it from coming in contact with the metal, the idea being to prevent the cutting of the tire when the car is taking a turn at high speed or when the tire is flat or under-inflated.

JOINT FOR SECTIONAL POLE (Fig. 16)—The end of one section is equipped with a central longitudinal sleeve from which radiate four kerfs, or double metallic walls, forming deep slots. The end of the other section is equipped with a central post from which radiate four blades, the post being designed to fit closely into the sleeve and the blades into the slots of the opposite section. The idea is to provide a strong joint for sectional tent or flag-poles that will permit the sections to be easily jointed together or taken apart.

TONGUE FOR HORSE-DRAWN VEHICLE (Fig. 17)—This tongue is braced to the front axle by a system of diagonal rods so that there is no lateral swing. The rear end of the tongue is supported on a yoke that projects forward from the bolster, the arrangement being such that while the tongue is free to move vertically, only a small part of its weight is carried on the necks of the horses.

FOCUSING HOOD FOR CAMERA (Fig. 18)—Intended as a substitute for the cloth ordinarily used by photographers, this hood is permanently attached to the camera and is equipped with an eyepiece. The hood is flexible and can be drawn out to any position required in focusing.

PIPE WRENCH (Fig. 19)—The gripping hand is made in two sections or jaws which are hinged together. One of the jaws is pivoted to the handle while the other is connected to it by a link, so that a pull on the handle tightens the jaws around the pipe.

LATCH FOR HOISTING HOOK (Fig. 20)—When the load is on, the latch is drawn closely against the hook. With the load resting on any support the pivot connecting the hook and latch is raised and the latch is drawn clear of the hook.

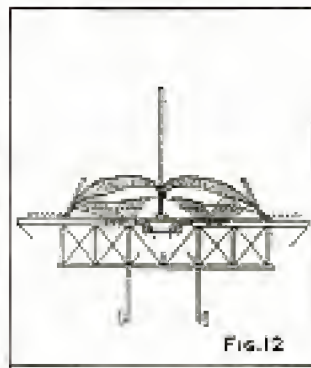


Fig. 12

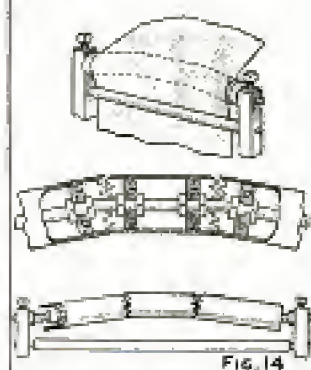


Fig. 14

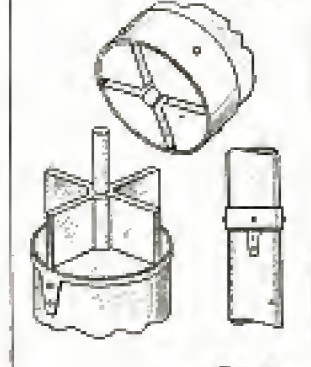


Fig. 16

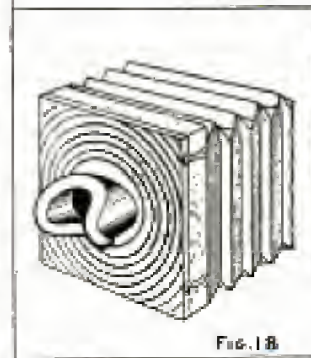


Fig. 18

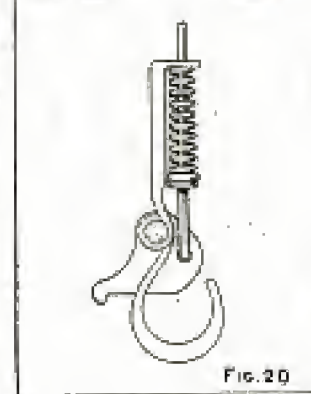
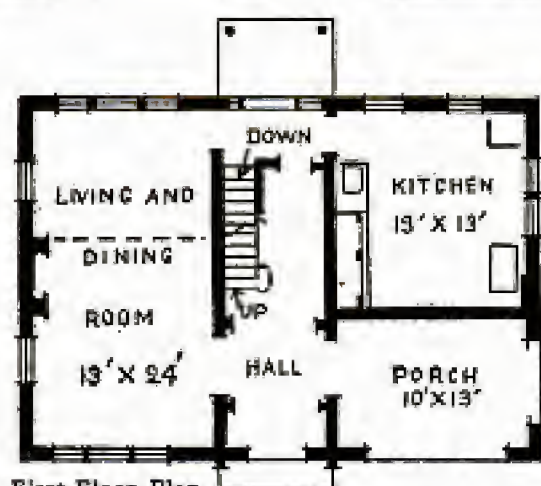
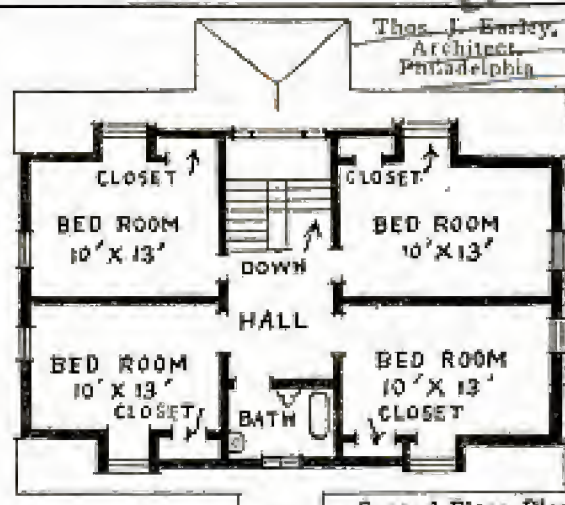


Fig. 20

FRAME COTTAGE WITH STUCCO EXTERIOR



First-Floor Plan



Second-Floor Plan

Thos. J. Earley,
Architect,
Philadelphia

THIS quaint cottage with its attractively arranged interior is an adaptation of the early American farmhouse to modern needs. While providing ample space for the second-story rooms, this type of construction is an economical one owing to the elimination of all but the gable walls above second-floor level. The cottage is of frame construction plastered on the outside with cement stucco, and is provided with a shingle roof. The exterior woodwork is of white pine painted white. The cost of the house complete was \$2,725. The principal feature of the interior is the hallways, one on each floor, extending from the front to the rear, and the arrangement by which each room opens into a hallway. Spaces at the sides of the dormer windows are utilized in providing a closet for each of the second-story bedrooms. A novel feature of the plan is the location of the entry to the kitchen under the landing of the stairway leading to the second floor. The equipment includes a hot-air heating plant.

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In our "Aladdin" pipeless furnace, we are offering the very latest departure in warm air heating. The principle is positive. Cold air is taken thru the base of the jacket and is forced upward thru a large 14x20 inch register placed directly over the furnace. Thru this register, the hot air passes with great force to the ceiling and circulates from there to all rooms. The warm air will be so evenly distributed that you will find a variation of less than three degrees between the room where the register is placed and the room farthest away from same, providing, of course, that doors connecting these rooms are left open to give a free circulation.

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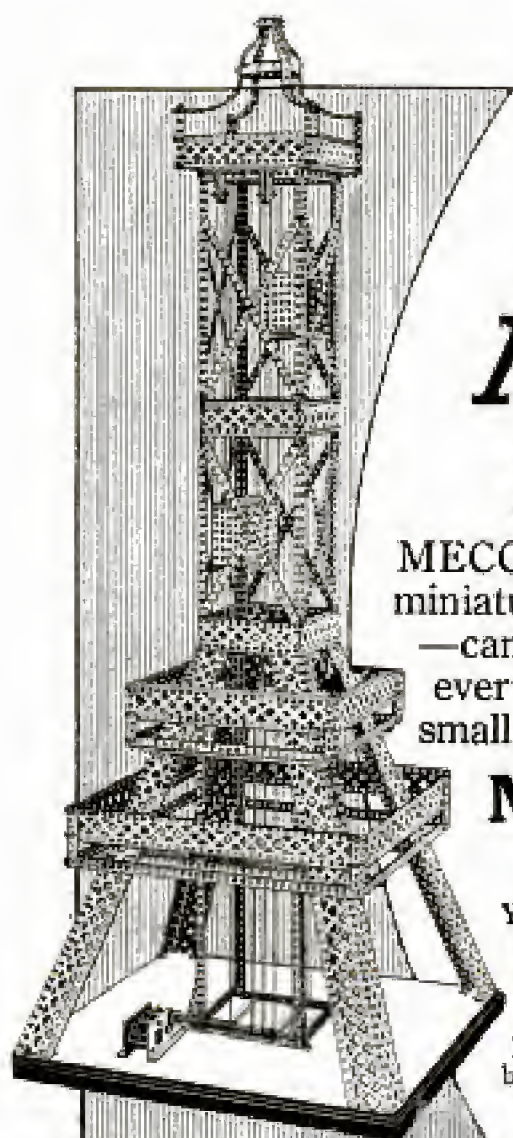
MECCANO Shows You What Real Engineering Is

You build just like a real Engineer, using miniature steel beams, girders, angle irons, rods, wheels, gears, nuts and bolts. MECCANO is the greatest toy ever invented for boys—it's an education in mechanics and engineering. The original building toy that builds mechanically correct models. The MECCANO-wise boy knows real engineering; he learns as he builds with MECCANO—and he has a heap of fun at the same time.

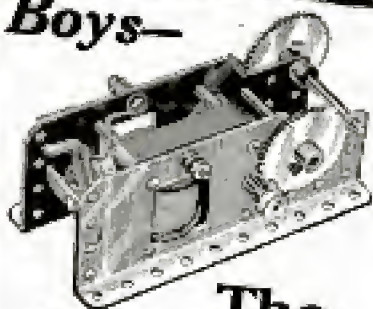
The number of models you can build with MECCANO is unlimited. You can build all those in our big Manual of Instruction, all those in any other Manual—and can keep right on building as long as you can think of anything to build.

The number of parts you get in an erecting outfit isn't what counts. How many ways can you use each part?

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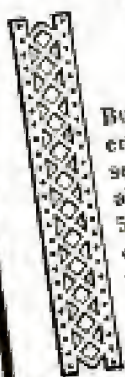
Boys—



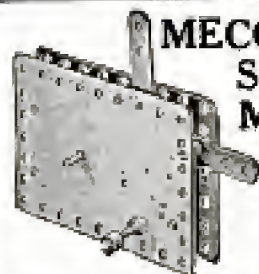
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Operates models like real machinery. Direct shaft and interchangeable gear wheel drive—positive and powerful. Two or three dry batteries run it. It's a real electric engine—the most powerful toy motor made. Above motor, with starting, stopping and reversing lever, included in Outfit No. 3X (\$7.50). Sold separately, with extra gears, for \$3.00. Same motor, without control lever and with fewer gears, included in outfits No. 1X (\$3.00) and No. 2X (\$5.00). Sold separately for \$1.50.

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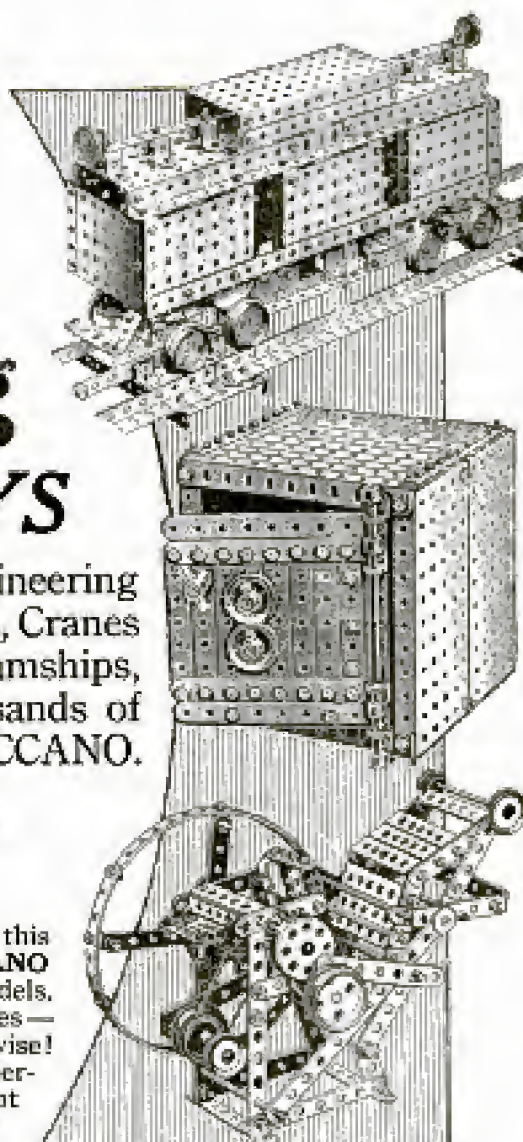
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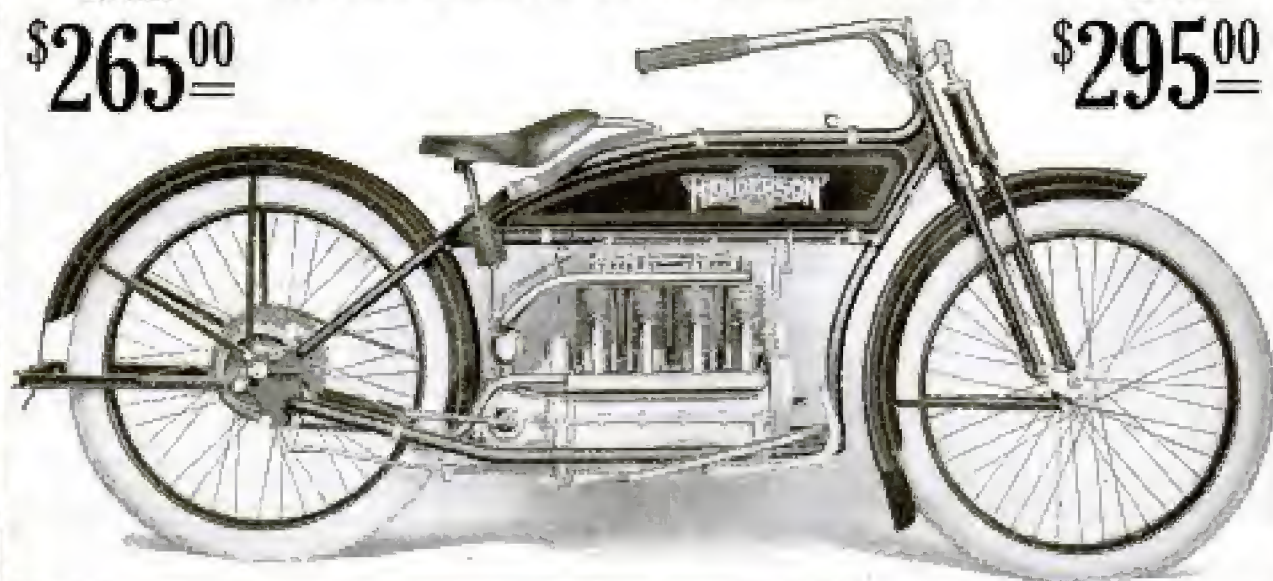
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MODEL**

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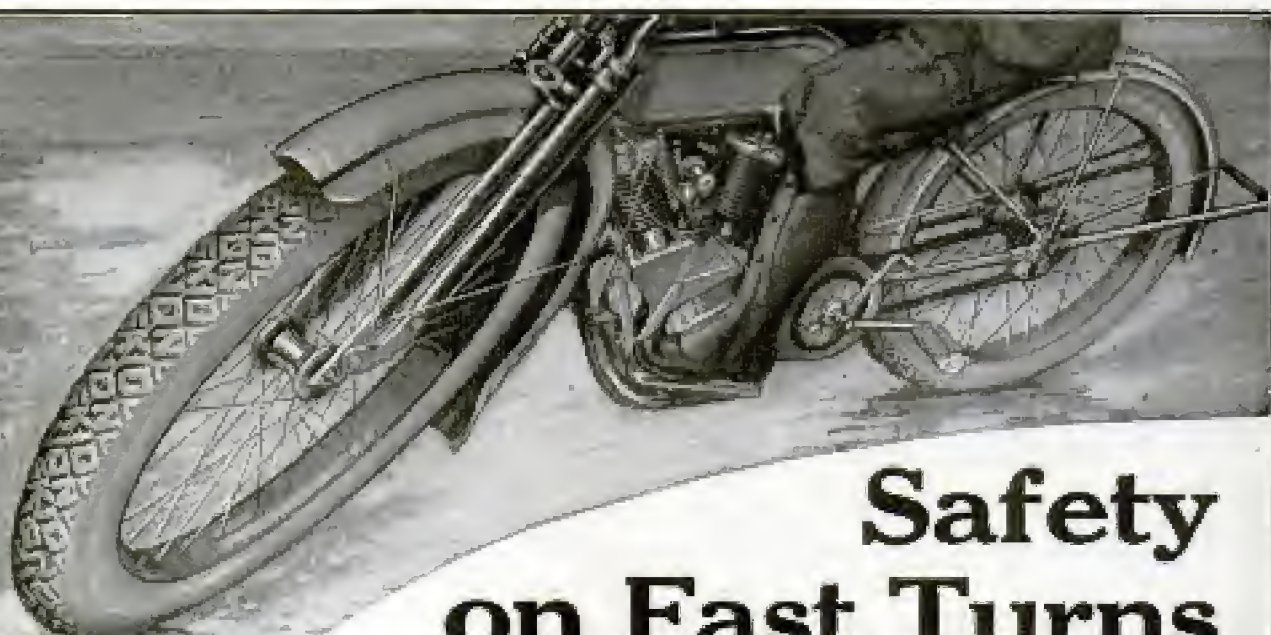
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Ride it to and from work. It's cheaper and more pleasant than street cars. In the evening steer your Miami straight for the country and let the rushing air wash the cobwebs from your tired brain. Get that glorious ozone of the open fields into your system. Then you'll understand why the farmer can always look trouble in the face and laugh in its teeth. No matter what your income you can afford the

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Reg. U.S. Pat. Off.
Power Bicycle

Model 15 Flat belt and idler, magneto ignition, pedal starter. Wt. with tank filled about 119 lbs. Price **\$125**

Model 16 Chain drive, two speed, foot boards, clutch, magneto ignition and kick starter. Wt. 125 lbs. Price **\$140**

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Safe, silent, clean. So simple in design that you don't require an expert garage man to show you how to run it. Operates as smoothly as an ordinary bicycle. Runs as quietly as a sewing machine. Tire expense practically as low as on an ordinary bicycle.

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We also make the Flying Merkel motorcycle and bicycle; also Racycle, Miami, and Hudson bicycles. Catalogs free.

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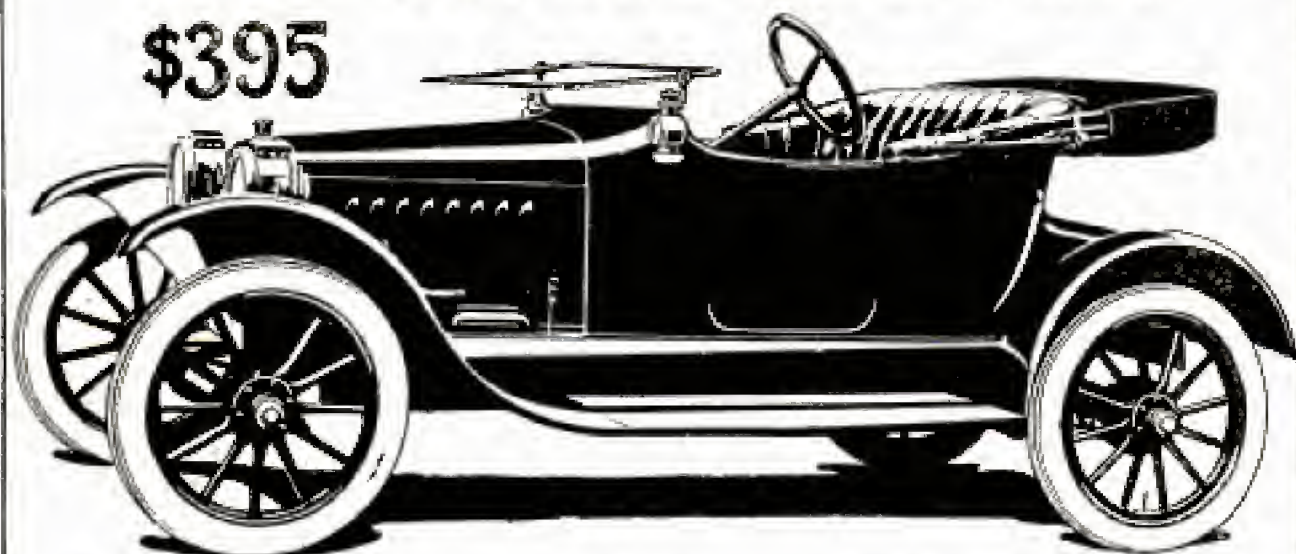
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In design and construction Saxon Roadster is absolutely modern and up-to-date—powerful high speed motor; sliding gear transmission; dry plate clutch; Timken axles; vanadium steel cantilever springs; honeycomb radiator; genuine streamline

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Every man who is mechanically inclined—which means every reader of Popular Mechanics—ought to have a Saxon Roadster. Any Saxon dealer will show you why Saxon is the finest two-passenger value yet produced.

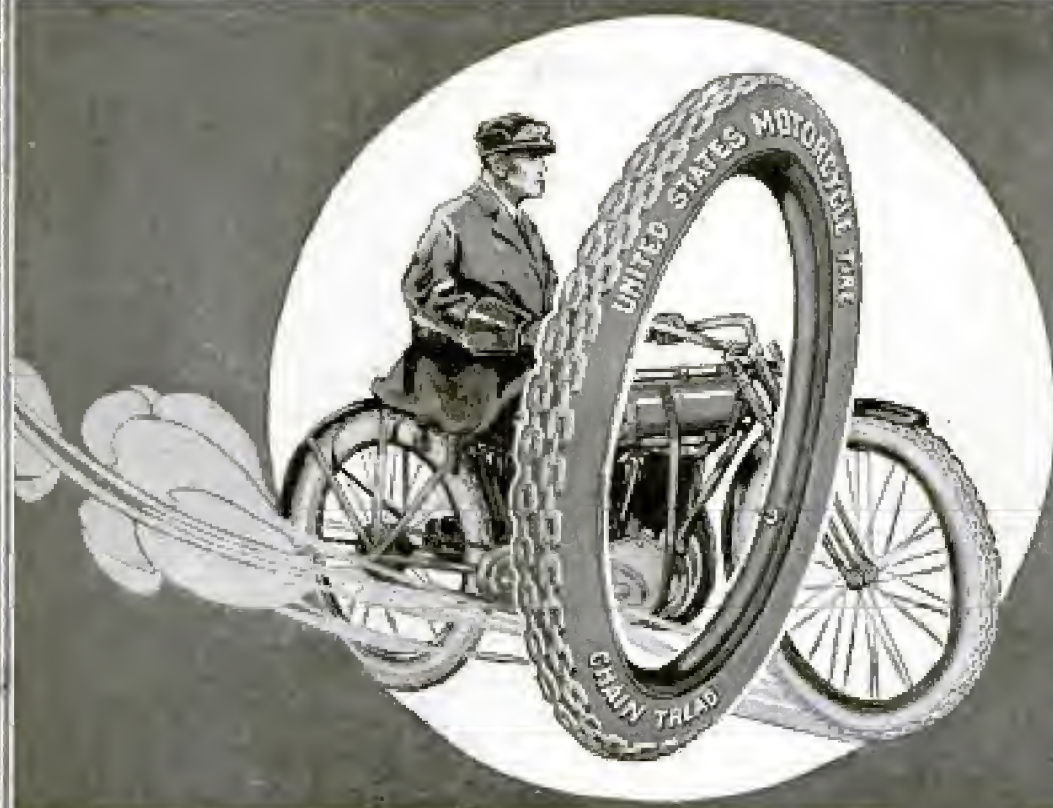


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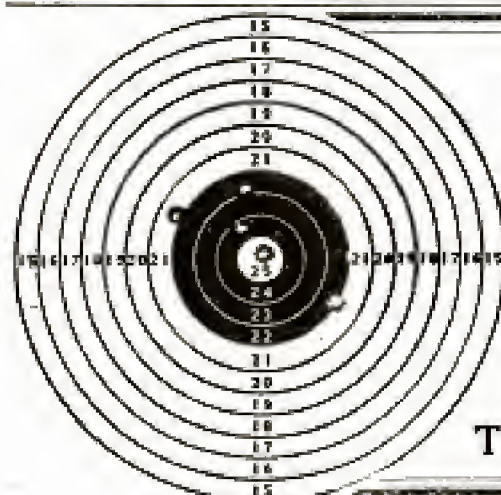
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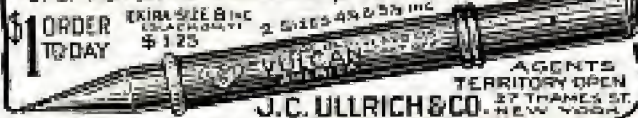
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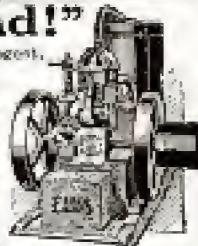
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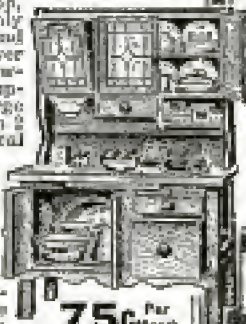
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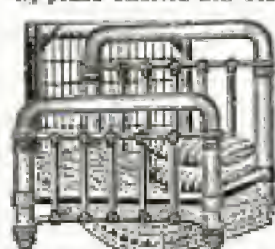
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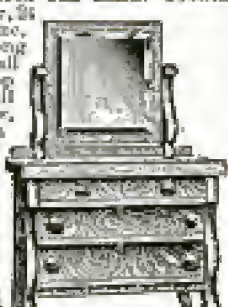
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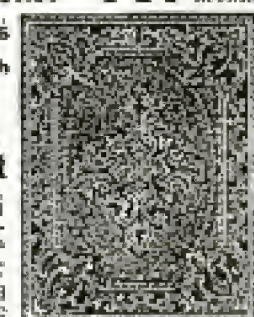
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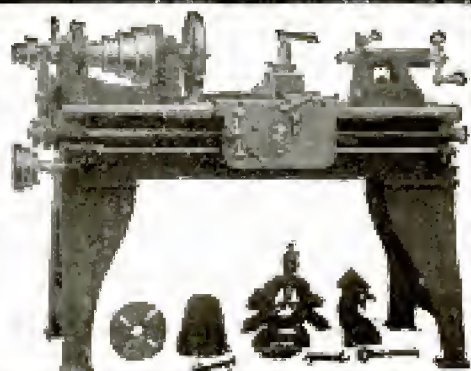
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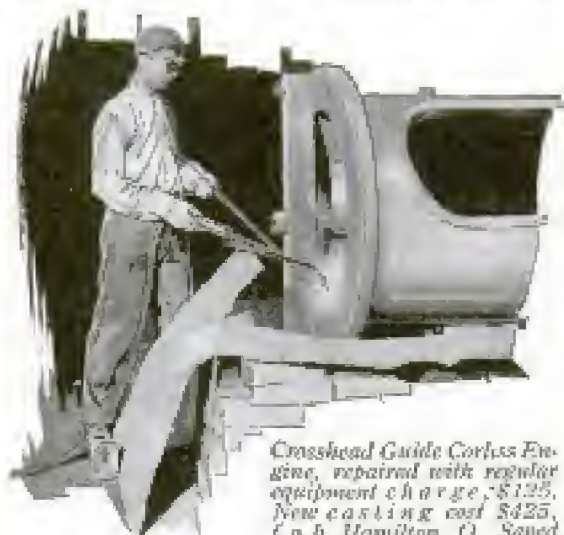


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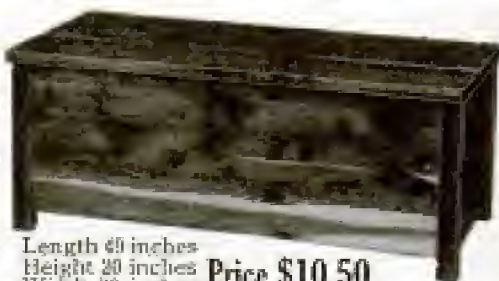
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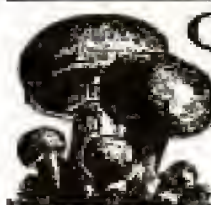
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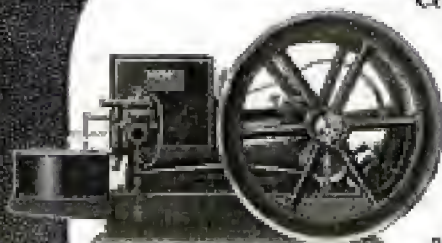
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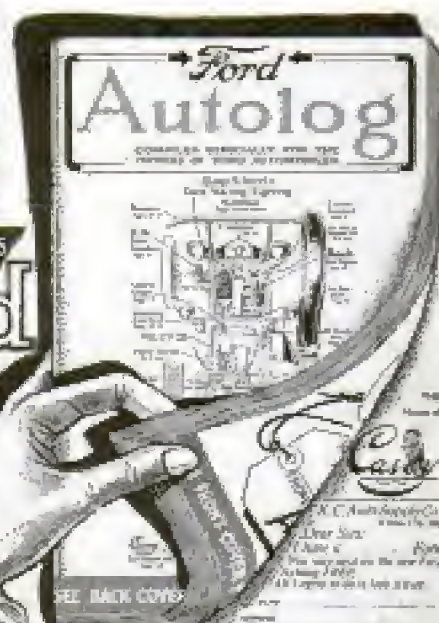
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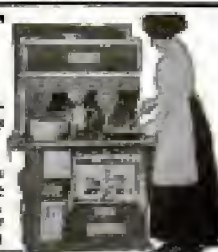
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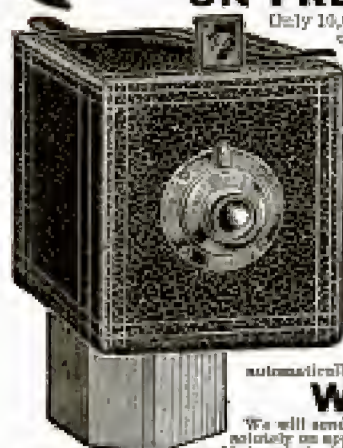
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If you decide to keep it, the express agent will forward the \$3.80 to us and it will be deducted from the \$39.80 price, leaving a balance of \$36.00, which you can pay at the rate of \$2.00 per month, the first monthly payment not being due until one month after date of delivery.

There are no interest charges, no red tape, no salesmen, no collectors, no bother. The simple coupon is all we require.

The typewriter we will send you will be delivered in the original package as put up in the factory of the manufacturer, perfect in every detail.

Send the coupon today. Make sure of getting this bargain, as we will only supply 100 typewriters at this price.

United States Typewriter Exchange
Dept. 306, All Light Bldg., CHICAGO, ILL.

Trial Order Coupon

United States Typewriter Exchange
Dept. 306, All Light Bldg., CHICAGO, ILL.

You may send me a No. 5 Oliver Typewriter on approval. When it arrives I will leave with the express agent \$3.80 with the understanding that if I do not wish to keep the typewriter the \$3.80 will be returned to me by the express agent when I return the typewriter to him within five days from the date I receive it.

Otherwise I will keep the typewriter and the \$3.80 will be forwarded to you to apply on your special purchase price of \$39.80, and I will pay the balance of \$36.00 in 18 consecutive monthly installments of \$2.00 each, commencing one month from date of delivery.

The title of the Oliver Typewriter remaining in you until it is totally paid for.

Name.....

Address.....

References.....

"Little Guard" the new Torrey

*gives a quick, smooth,
clean shave*

Here's a real safety
guard razor, shaves
in the only correct
way, cuts close,
doesn't rough
the skin.

\$2

Like all

Torrey

razors, this
new safety has
the perfect shav-
ing edge. Hold like
any other real razor—
it's two-thirds size. Has
reversible safety guard.

If your dealer hasn't Torrey
razors, write us; we'll tell you
where to get them. Ask for Free
Booklet, "How to Shave."

*The new Torrey Hon-
ing Strip has no equal*

THE J. R. TORREY RAZOR COMPANY
Dept. P, Worcester, Mass.



BEACON BURNER FREE FITS YOUR OLD LAMP

100 Candle Power Incandescent pure
white light from (kerosene) coal oil. Burns
either gas or electricity.

COSTS ONLY 1 CENT FOR 6 HOURS
We want one person in each locality to whom
we can refer new customers. Take advantage of
our Special Offer to secure a Beacon Burner
FREE. Write today. **AGENTS WANTED.**

HOME SUPPLY CO., 111 Home Bldg., Kansas City, Mo.

BUY PLUMBING and HEATING SUPPLIES

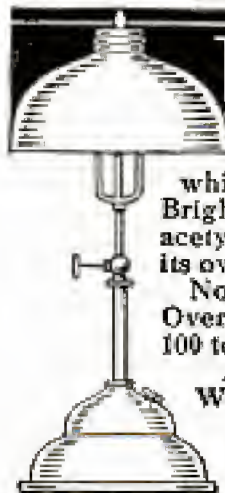


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**Will Save
You 30%**

Don't pay retail prices. Full stock on hand
for prompt shipment. Send for free catalog.

B. P. KAROL, 800-802 South Kedzie Ave., CHICAGO



The "BEST" LIGHT

A soft, luminous light,
which casts no shadow.
Brighter than electricity or
acetylene. Makes and burns
its own gas. Costs 2c a week.
No dirt, smoke nor odor.
Over 200 styles, ranging from
100 to 2000 candle power.

Absolutely guaranteed.
Write for illustrated catalog.

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324 E. 5th St., Canton, O.

OWN A BUSINESS WE WILL HELP YOU.



"I made \$88.16 first three days," writes Mr.
Reed, of Ohio. Mr. Woodward earns \$170 a month.
Mr. M. L. Smith turned out \$301 in two weeks. Rev.
Crawford made \$7.00 first day. See what they have
done, judge what you can do.

LET US START YOU

in Gold, Silver, Nickel and metal plating. Prof.
Gray's new electro machine plates on watches,
jewelry, tableware, and metal woods.
Prof. Gray's New Royal Immersion
Process latest method. Goods come out
instantly with fine, brilliant,
beautiful thick plate, guar-
anteed three to ten years. No
polishing or grinding. Every
family, hotel and restaurant
want goods plated.

PLATERS HAVE ALL THEY CAN DO

People bring it. You can hire boys to do the plating as we do.
Men and women gather work for small per cent. Work is fine—
no way to do it better. No experience required, we teach you.
Recipes, Formulas, Trade Secrets Free. Outfits ready
for work when received. Materials cost about ten cents to do
\$1.00 worth of plating. Our new plan, testimonials, circulars and
SAMPLE FREE. Don't wait. Send us your Address anyway.

GRAY & CO., PLATING WORKS

856 Gray Building

CINCINNATI, OHIO

Sunshine Lamp 300 Candle Power FREE!

To Try in Your Own Home

Turns night into day. Gives better light than gas,
electricity or 10 ordinary lamps at one tenth the
cost. For Homes, Stores, Halls, Churches. A child
can carry it. Makes its own light from common
gasoline. Absolutely SAFE.

COSTS 1 CENT A NIGHT

We want one person in each locality to whom we
can refer new customers. Take advantage of our
SPECIAL FREE TRIAL OFFER. Agents Wanted.

SUNSHINE SAFETY LAMP CO.

616 Factory Bldg. Kansas City, Mo.



KRUPP'S BURGLAR-PROOF SAFE—It is reported
that the Krupp works have just turned out a steel safe
that will put all burglars to shame, being made of a
steel of such resistance that it withstands all methods of
attack and tools known at present. At one test of a
plate of this steel, a 2-in. hole, 1 1/2 in. deep, was made in
the plate, but for this not less than 470 gal. of acetylene



Small Engines

Our illustrated book tells all about our won-
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SIX SEAT STARTER FOR FORD CARS

Shipped on trial. Send stamp for Booklet and Special Offer

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Fine Taxidermy Book Now Free! 120
with hundreds of photos of mounted
birds and animals. Learn this profession. Save your trophies,
Decorate your home and den. Great value to sportsmen.

Learn to Stuff Birds animals, game heads,
and robes. Quickly learned by men and boys. Big Profits from
spare time. Intensely interesting. **INVESTIGATE!** Write Today
for Free Book. Only a few more so rush.

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Just out. Going with a rush. Every home
a prospect. Converts any pot into perco-
lator. Makes better coffee—saves third to
half. Aluminum. Quick sales.

Profits \$24 to \$36 a Week

Most percolators cost \$3 to \$5. **FITS-TE-POT**
sells for \$1. Practical—absolutely new.
Our free premiums stimulate sales. Write
quick for agency.

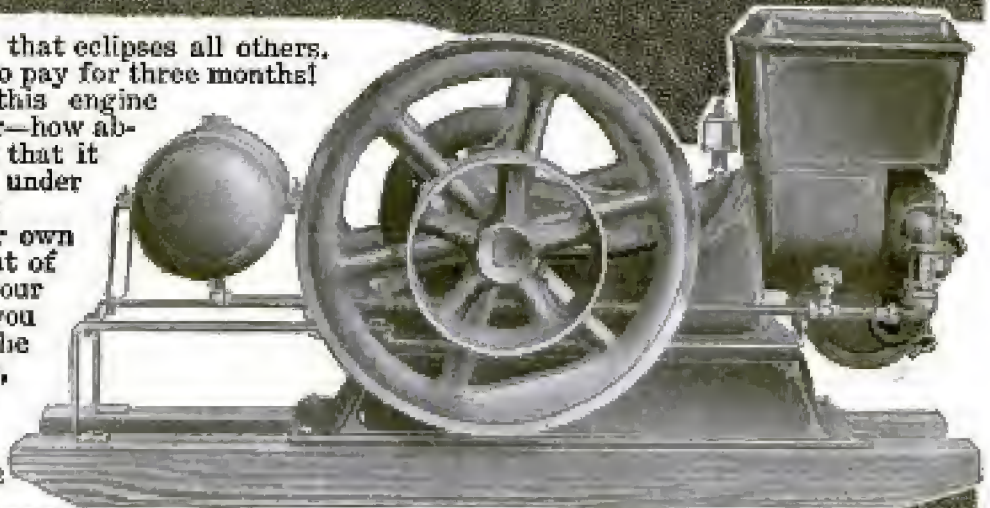
Standard Spinning & Stamping Company
110 Smead Ave. Toledo, Ohio

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Not One Cent To Pay For Three Months

Here is the engine offer that eclipses all others. Think of it—not one cent to pay for three months! How absolutely perfect this engine must be in every particular—how absolutely sure we must be that it will positively make good under all conditions when we say:

Use this engine on your own work. Don't send us a cent of your money until, from your own experience with it, you are absolutely sure it is the engine you want. If it isn't, send it back at our expense. If it is, you may use it for three whole months before you make even the first payment and then pay the balance in 6, 9 and 12 months—giving you



MAJESTIC STATIONARY ENGINE
Sizes 2, 3, 5, 7, 9 and
14 Horsepower

A Year To Pay Without Interest

There's a guarantee of quality the like of which has never been heard before.

The Majestic is such an amazing triumph of engine construction that we will gladly send any size to suit your needs so that you, by testing it out on your own place, may prove our claims at our risk.

No Money In Advance

Only the great House of Hartman with its enormous \$10,000,000 capital can afford to sell an engine at the remarkable bargain price of the Majestic, back it up with a strong guarantee and extend such liberal credit terms—the most liberal ever conceived.

The Great Majestic Engines Gasoline, Kerosene, Naphtha, Gas

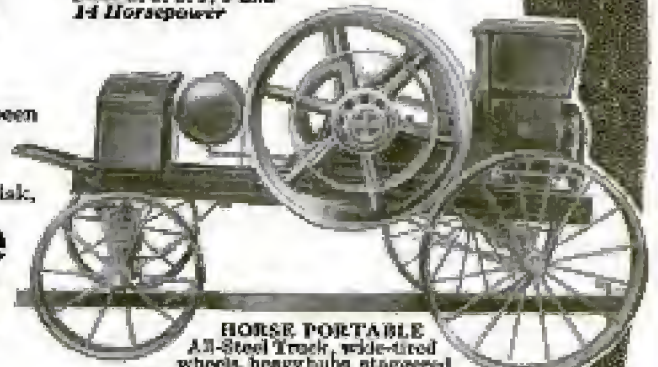
The Majestic is the "happy medium"—neither too heavy nor too light. Has fewer number of parts—a marvel of simplicity. Perfectly balanced—just the right weight for the power it is designed to develop—no excessive friction.

The Majestic must not be confused with old-style, over-heavy type of gasoline engines which are made after patterns designed years ago and which consume enormous amounts of fuel and are, therefore, expensive to operate. Neither is the Majestic of the opposite extreme type, that are so light they literally jerk and tear themselves to pieces when running at high speed or under a heavy load.

The Majestic is the simplest, most durable, most powerful for its H.P. rating and most economical to operate gasoline engine ever made.

Big improvements in all vital parts—and the most wonderful automatic mixer ever put on a gasoline engine.

All Majestics are horizontal, 4-cycle type, open jacket, hopper cooled. No over-heating of parts or sticking of valves. Very little water needed for cooling. Convenient, compact, easy to run.



HORSE PORTABLE
All-Steel Truck, wide-tired wheels, heavy hubs, staggered spokes. Front axle is swivel type so made that wheels, passing over obstructions, do not disturb level of engine. 6, 7, 9 and 14 H.P., mounted this style.



**PORTABLE
WOOD SAW**

Table slides on wheels, cannot sag or get out of alignment. Outfitted complete, ready for work. 6, 7, 9 and 14 H.P., mounted this style.

YOUR CREDIT IS GOOD

If you need power, no matter where you live, this offer is for you. No bank deposit—no references—no mortgage—no embarrassing questions—no collectors—no red tape. You may pay all cash if you prefer. It costs you not one penny extra to take advantage of Hartman's most liberal credit terms.

FREE Engine Book The most valuable, most interesting book of engines ever published. Tells all about the wonderful Majestic, how made, and why it is the biggest engine value in America today. Tells how to pick out the size and style engine best suited for your needs and explains the famous Hartman selling plan. Mail Coupon for Engine Catalog No. 64-E

The Hartman Co.
3945 LaSalle St., Chicago, Ill.

**FREE Engine Book
COUPON**

THE HARTMAN COMPANY,
3945 LaSalle St., Chicago, Ill.

Without obligating me, send your Engine Catalog No. 64-E and particulars of selling plan.

Name.....

Address
P. O. Box.....
or R. F. D.

Town..... State.....



Please Mention Popular Mechanics

TAILOR MADE TO ORDER 6 MONTHS TO PAY



Be the swiftest dresser in your set. Wear clothes that virtually breathe class. Take six months to pay for them. Get acquainted with America's greatest price-smashing tailoring house. See how our tremendous buying power gives us the pick of the world's finest fabrics at lowest prices known. Our catalog will astound you. Write for it.

Save Half!

Think of it! **\$25 tailored-to-your-order Suits and Overcoats only \$15 from our \$35 values only \$10, etc.** Don't buy ready-mades and pay double our price. Don't pay other tailors two or three times as much as we charge. Don't buy clothes that can't be guaranteed to the limit. We must make good clothes to uphold our reputation.

Only \$2.30 Per Month!

No need to sacrifice the advantage of made-to-order clothes. So easy to pay our way that you won't miss the money. We trust you. No references required. No red tape. No delay. No collectors. No extra charge for the credit. Absolutely rock-bottom prices.

BEWARE

of the houses advertising "made-to-measure" clothes who don't dare to back up their claims. Don't be fooled into accepting altered-to-fit ready-mades as made-to-order clothes. Deal with the house that believes in quality and fairness.

\$1,000 Reward To anyone who proves that we do not make all our garments absolutely tailor-made to your own individual order and measurements. There's our sensational offer. Don't confuse us with the ordinary run of so-called tailoring houses. We're different. See our money-back guarantee in our catalog.

DeLuxe Book of Style FREE!

Just off the press—our wonderful Book of 1916 Fall and Winter Fashions. Most advanced and exclusive styles—the choicest designs from the world's greatest style centers. The cream of the greatest mills. Write for it today. Post cards bring it free together with full particulars of the most sensational offer ever made in the history of high class tailoring. Write now!

STANLEY-ROGERS CO., 544 S. Clark St., Chicago, Ill.

Here's a New Business



Reproduce Photographs of persons and scenes upon watch cases, dials, china, etc. Work really done. Reproduction of photographs, not hazy. **TRIAL CUTTING** with engraving, \$2 postpaid—Confidence enough to order at least 10 reproductions that you should sell from \$1.50 to \$2.00 each. **ORDER TODAY. Satisfaction Guaranteed.**

AMERICAN ARTS & CRAFTS COMPANY, BOSTON, MASS.

BARODA DIAMONDS

FLASH LIKE THE GENUINE—AT 1-50 THE COST
SOLID GOLD MOUNTINGS Stood acid test and expert examination. See them first, then pay. Catalog FREE. Talent Ring Gauge included for 5 two-cent stamps. The Baroda Co., Dept. 35, 1454 Lake St., Chicago



Cut Your Own Hair

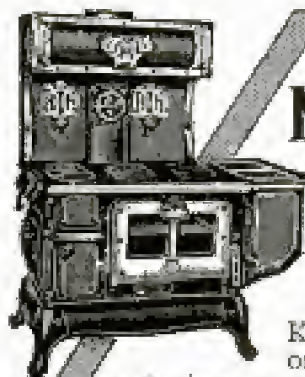
Save Time and Money

It is now possible for you to cut your own hair—in to cut it just as efficiently as the barber, in less time and with less expense, if you have a **MORRISON'S**

SAFETY HAIR CUTTER

The only device of its kind on the market—works like a comb, no clipping. Just the thing you've needed. Send \$1 today. Or write for further information.

Dealers—A sensational seller—sells on sight. Easy work, lots of profit. Write us for our money-making proposition.
AMERICAN SAFETY HAIR CUTTER CO.
103 Bindley Power Building PITTSBURGH, PA.



Write Today - See New Styles 1916 Prices

GET the 1916 wholesale price offer from Kalamazoo on 500 styles

and sizes of best quality stoves and ranges. Mail postal or letter today for

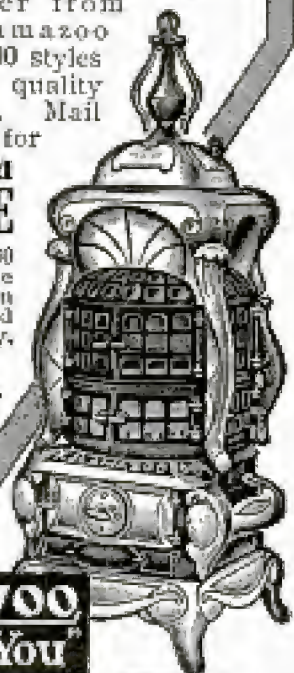
New Catalog and "Recipes FREE in Rhyme"

Cash or easy payments—30 days' trial—year's test. We pay freight and ship within 24 hours. \$100,000 bank bond guaranty. Write today.

Ask for Catalog 473

Kalamazoo Stove Co., Mrs.
Kalamazoo, Michigan

Stoves, ranges, gas stoves
furnaces, white enameled
metal kitchen cabinets and
tables, 4 catalogs—please
say which you want.



"A Kalamazoo Trade Mark Registered Direct to You"

and 534 gal. of oxygen were used and the time consumed was one and one-quarter hours. In order to produce a hole large enough to admit the hand, 2,642 gal. of oxygen and 2,378 gal. of acetylene would be needed, while the performance of this work would require six hours. It is evident, therefore, that burglars will never succeed in melting open a safe made from the new steel. The steel is very hard and cannot be bored, so that the holes for the screws and rivets must be made at the start. The new material does not lose its hardness by annealing.



CLASSPINS



FACTORY TO YOU

Made to your special order, any style or material. Write today for free catalog of 1916 designs. Special offer, either style of pins here illustrated with any equal number of letters and figures, with one or two colors of best hard enamel. **SILVER PLATE, \$1.15 each, \$1.50 per dozen; STERLING SILVER, \$3.50 each, \$3.00 per dozen; GOLD PLATE, \$3.35 each, \$3.00 per dozen; SOLID GOLD, \$1.80 each, \$15.00 per dozen.** BASTIAN BROS. CO., 825 EASTMAN BLDG., ROCHESTER, N. Y.

Champion Racer



Our set contains this and 9 other drawings, with instructions for building..... **\$1.00**

MODEL AEROPLANES

Send 2c postage for Complete handbook of Models and Supplies.

WADING RIVER MFG. CO.
WADING RIVER, N. Y.



Amazing Profits In Mushrooms

Anybody can add \$5 to \$10 per week to their income. In spare time, entire year growing mushrooms in cellars, sheds, barns, houses, etc. I tell you where to sell, at highest prices. Free Illustrated Instruction Booklet

HIRAM BARTON

Desk 2, 329 W. 45th St., New York

Agents! 500% Profit

\$25.00 to \$50.00 a week that's what our agents are making selling our new metallic sign letters for office windows, store windows and glass signs. For a quick, easy money making proposition for agents, salesmen and sign painters, there is nothing to equal the selling and putting up of our new metallic letters and numbers. There is no experience necessary to put up these signs. Anyone can succeed and make money right from the start. We will send you full particulars and you will see how easy it is to make money in this business. One agent says: "Have already put up 14 signs in this little burg and more in sight. Your letters are the best thing I have seen in years. Will soon be in a position to buy in 5000 lots." Another says: "I am getting all the work I can do and the letters have given entire satisfaction everywhere." We are daily receiving such letters from agents who have started in the sign letter business. This is the only field that is not overcrowded. There is a big demand for window and glass signs in every town. You can sell to nearby trade or travel from town to town all over the country as you please. We would be pleased to send you a free sample and full particulars.

WRITE TODAY. ADDRESS

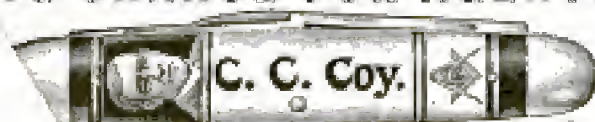
The Metallic Sign Letter Co.
407 N. Clark Street, CHICAGO, U. S. A.



Mobiloils

A grade for each type of motor

BIG CHANCE FOR AGENTS



You can earn BIG MONEY

Get complete line of guaranteed transparent handle Razors with Photo, Name and Logo Emblem of cutlery. Write today for catalogue and terms. Cutlery Co., 554 W. Lake St., Dept. 209, Chicago, Ill.

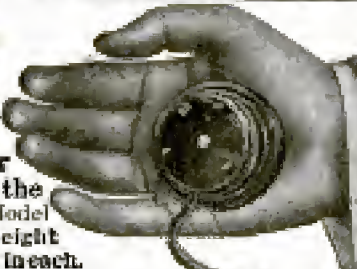
Better Hearing

Write today for our 15 day trial offer of the New 1915 Thin Receiver Model Mears Ear Phone. It has eight adjustments of 12 sounds in each.

96 Degrees of Sound

The complete range of tone for the human ear is covered. It is the final perfection of an efficient substitute for the natural hearing organs. Instrument hardly noticeable.

Write for Free Book Write today for valuable book on deafness sent free. It explains our low direct prices to you. No middleman's profit—15-day free trial offer. If you are a sufferer from deafness—if you have a deaf friend don't fail to write for this book. Mears Ear Phone Co., Dept. 1197, 45 W. 34th St., New York City



FISH'S "HOME MAKER'S"

BOOK—FREE

WRITE for our wonderful 292-page book, "The Home Maker." It's filled with 4,945 useful and ornamental articles for the home. Tells you how to furnish and beautify your home—how to buy anything you want on credit with a whole year to pay—without fuss, bother or publicity. A book of honest values at amazingly low prices. Below are hints of our offerings. Write for the book today. Order direct from this ad if you like and send only first payment.

RICH UP-HOLSTERED ROCKER



A massive, luxurious, overstuffed Rocker, high-grade in construction and workmanship. Seat, back and arms are carefully upholstered and covered in black Royal Leather or Spanish Supreme Leather. (State which is wanted.) Seat is spring-stuffed over extra heavy braced steel springs. Back and front are neatly tufted.

Iris Wonder Oak Heater



Strong and durable in construction, handsome in appearance, economical in fuel consumption. Burns any kind of fuel. Has heavy cast iron fire pot and cast-iron screw draft regulator. Body of sheet-steel. Beautiful nickel trimmings.

Washing Machine Bargain



WONDER STEEL RANGE
Price (with-
out reservoir) \$19.85
Price with reservoir \$23.75
A massive magnificent Range at a record-breaking price. Body is made of polished cold rolled blue steel, built to give a lifetime of service. Range has steel built-in oven, steam, duplex grates and large oven (18x20x18 inches.) Handsome nickel trimmings.

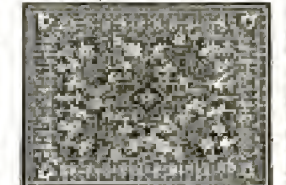
30 Days' FREE TRIAL

We give you a month in which to prove the goods we sell you. If dissatisfied we refund first payment and pay transportation for both ways. We take all of the risk, giving you a YEAR TO PAY. Enjoy your furniture while paying for it.

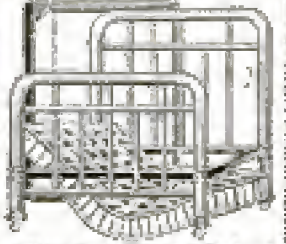
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CHICAGO

Please Mention Popular Mechanics



Tapestry Brussels Rug
Price like \$912 to \$1,045
A-242 75 cents a month
Wonderful value. Closely and firmly woven of fine, selected yarns, with firm, heavy back. Beautiful floral and oriental patterns in rich, artistic, non-fading color combinations of tan, green and red. State whether floral or oriental pattern is wanted and what colors you like best.



IRON BED OUTFIT
Price \$8.85 75c Cash 75c a Month
No. A-243
Consists of Handmade mattress, perfect woven wire spring, and full 45 lb. cotton top mattress.



Washing Machine Bargain
Price \$7.35 50 Cents Cash 50 Cents a Month
No. A-237
The Wonder Matory is the most practical washing machine ever offered at so low a price. Saves health and labor. Cleans finest fabrics without slightest danger of injury. Built in a d.c. of Louisiana. Hot Copper front with steel hands and constructed on inside. Built in a d.c. of Louisiana. Hot Copper front with steel hands and constructed on inside. Built in a d.c. of Louisiana. Hot Copper front with steel hands and constructed on inside.

30 Days' FREE TRIAL

We give you a month in which to prove the goods we sell you. If dissatisfied we refund first payment and pay transportation for both ways. We take all of the risk, giving you a YEAR TO PAY. Enjoy your furniture while paying for it.

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30 Days' FREE TRIAL

We give you a month in which to prove the goods we sell you. If dissatisfied we refund first payment and pay transportation for both ways. We take all of the risk, giving you a YEAR TO PAY. Enjoy your furniture while paying for it.

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CHICAGO

Please Mention Popular Mechanics

Crippled Children

This boy was born with Club Feet. When three years old his father brought him to this Sanitarium and his feet were permanently straightened, as is shown in the picture.

In 1907 the boy developed Potts Disease, which, as is generally known, is a progressive, destructive disease of the spinal bones, usually tubercular, always deforming and frequently causing paralysis. He was then barely able to walk. Because of his father's experience with us in the treatment of his feet he brought the boy here for the treatment of Potts Disease and today he is a strong, well, happy boy. Look at the photograph; read his father's letter, dated Dec. 20th, 1914.

"Lloyd is now the picture of health. Am thankful that I knew of the Melain Sanitarium for it surely saved our boy's life. I will be pleased to answer any inquiries in regard to the treatment. You may publish this if you wish, as I cannot say enough in favor of the Melain Sanitarium."—H. J. Down, Spirit Lake, Iowa.

Write to Mr. Dowd and ask any questions. He will answer.

For thirty years this Institution has successfully treated

DEFORMITIES

Including all Spinal Troubles, Hip Disease, Infantile Paralysis, Club Feet, Bow Legs, Knock Knees, Wry Neck, etc., especially as found in children and young adults. Write for our book, "Deformities and Paralysis"; also book containing testimonials from practically every state. Refuse.



The McLain Orthopedic Sanitarium
902 Aubert Avenue ST. LOUIS, MO.

STOP USING A TRUSS

Do Away With Steel And Rubber Bands

FREE TRIAL



Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continuously applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the first 5,000 Sufferers who write, I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating ruptures. Plapao is a highly anesthetic medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Home and Grand Prix at Paris.

Send No Money—For a sufficient quantity of the Plapao is sent without charge to enable you to give it a thorough test; you pay nothing for this trial now or ever. Write for it and full information today. Address: Plapao Laboratories, Block 1427 St. Louis, Mo.

"I Would Not Part with It for \$10,000"

So writes an enthusiastic, grateful customer. "Worth its weight in gold," says another. In like manner testify over 100,000 people who have worn it.

The Natural Body Brace

For MEN and WOMEN.

Develops erect, graceful figure, overcomes **WEAKNESS** and **AILMENTS of Women & Men**. Brings womanly beauty and manly strength, restful relief, ability to work and enjoy life.

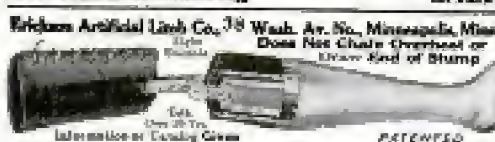
Banishes All These Troubles

Does away with the strain and pain of standing and walking; replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens and strengthens the back; corrects stooping shoulders; develops lungs, chest and bust; relieves backache and nervousness. Comfortable and easy to wear.

Wear It 30 Days Free at Our Expense

Write today for illustrated booklet, measurement blank, etc., and read our very liberal proposition.

HOWARD C. RASH, Pres. Natural Body Brace Co.
223 Rash Building SALINA, KANSAS



We are Under Govt. Bond

Water power in Switzerland is utilized to such an extent that in some towns not an ounce of coal is burned, power, light, and heat being furnished by hydroelectric plants.

Deafness



Perfect hearing is now being restored in every condition of deafness or defective hearing from causes such as

Relaxed or Sunken Drums, Roaring or Hissing Sounds, Perforated, Partially Destroyed Drums, etc.

Wilson Common-Sense Ear Drums

"Little Wireless Phones for the Ears"—require no medicine but effectively replace what is lacking or defective in the natural drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe and comfortable to wear at all times.

Write today for our 168 page FREE book on DEAFNESS, giving you full particulars and plenty of testimonials.

WILSON EAR DRUM CO., Incorporated
101 Inter-Southern Building LOUISVILLE, KY.

NO MORE BALD HEADS



When our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops hair loss, stops the hair from falling out. Bought by doctors and men who

know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR," sent sealed in plain envelope. FREE.

THE MODERN VACUUM CAP CO.

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Tobacco Habit BANISHED

in 48 to 72 Hours



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Trying to quit the tobacco habit unaided is a losing fight against heavy odds, and means a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take Tobacco Redeemer according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or for 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff Tobacco Redeemer will positively remove all craving for tobacco in any form in from 48 to 72 hours. Your tobacco craving will begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer is absolutely harmless and contains no habit-forming drugs of any kind—the most marvelously quick and thoroughly reliable remedy for the tobacco habit the world has ever known.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It quiets the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of Tobacco Redeemer treatment for the habit.

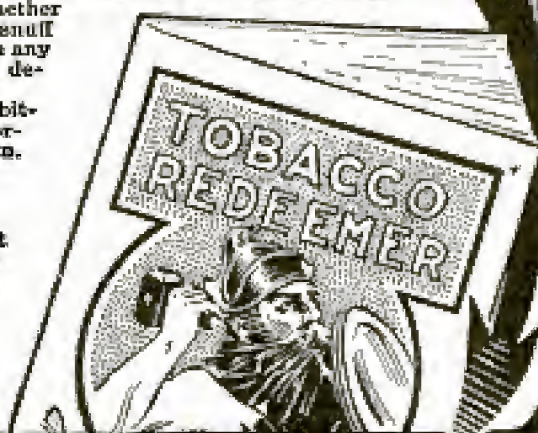
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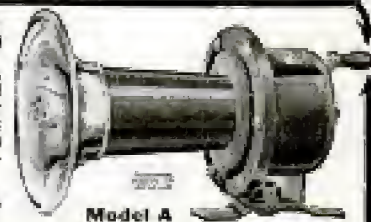
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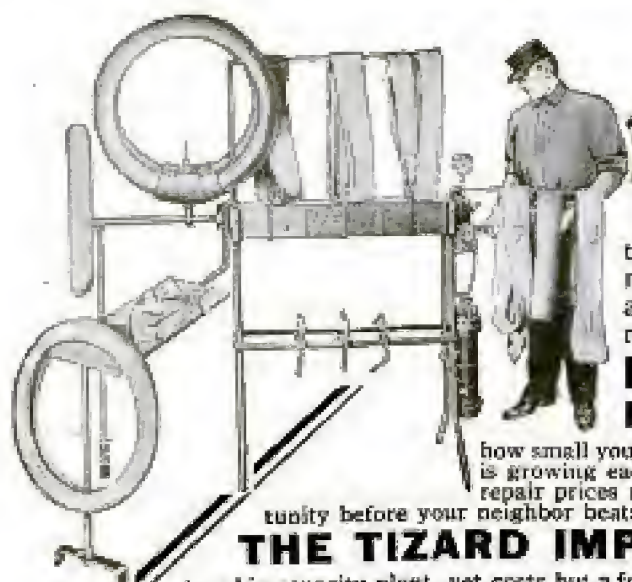
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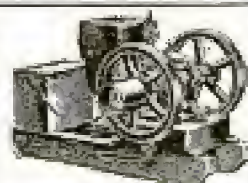
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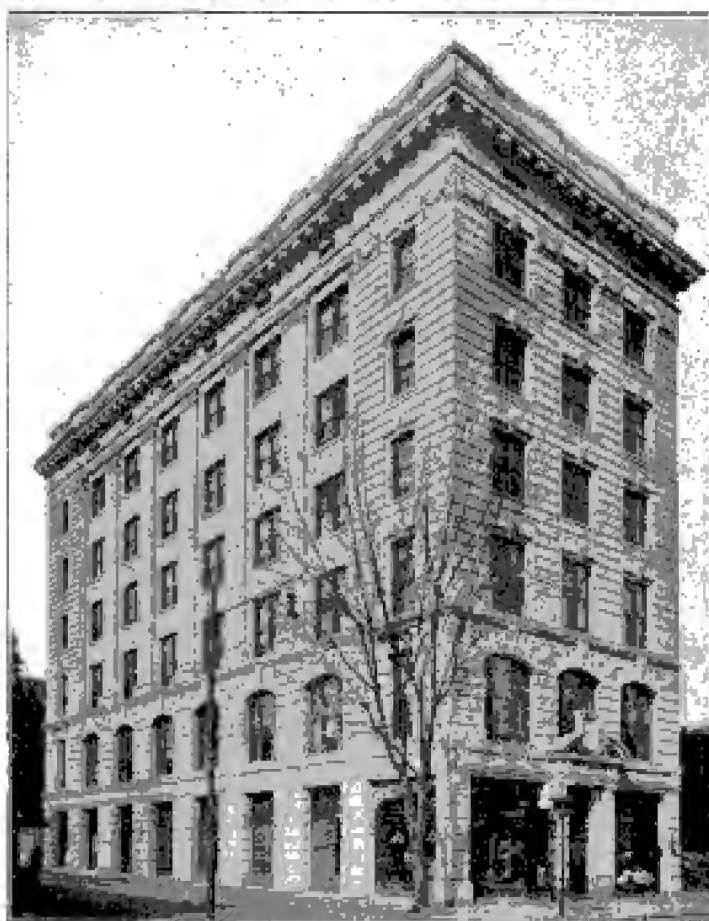
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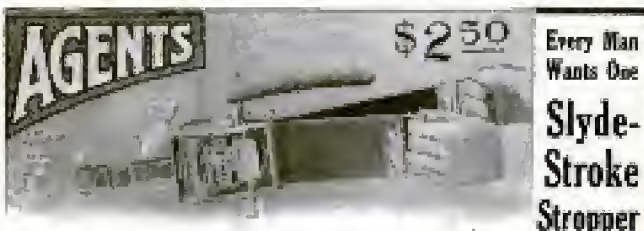


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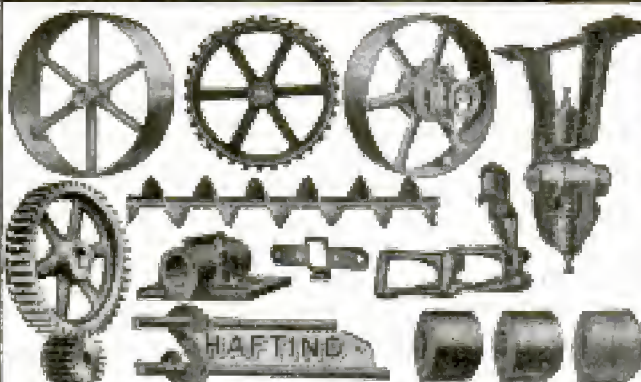
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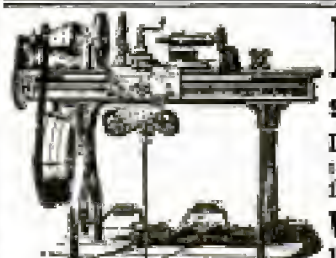


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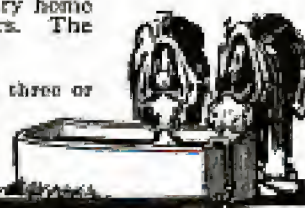
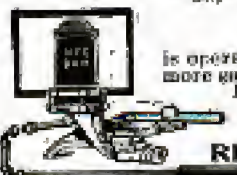
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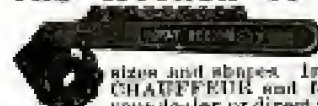


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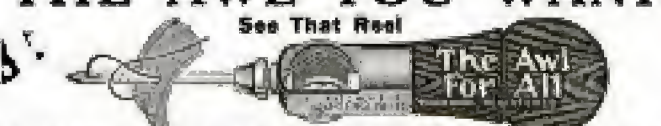
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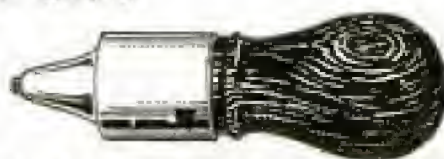
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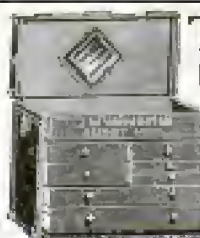
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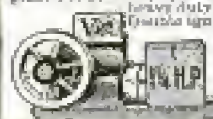


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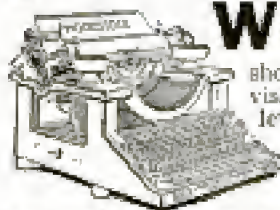
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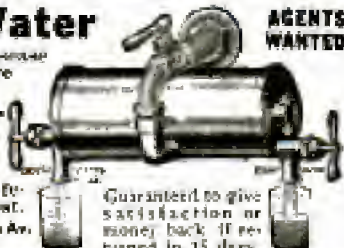
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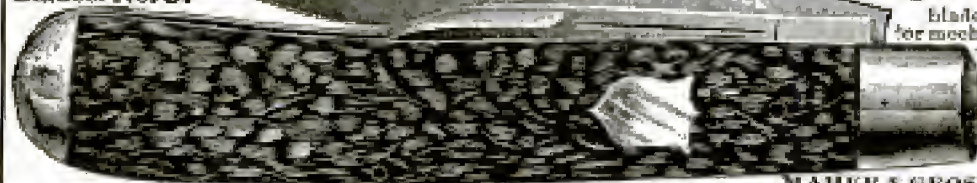


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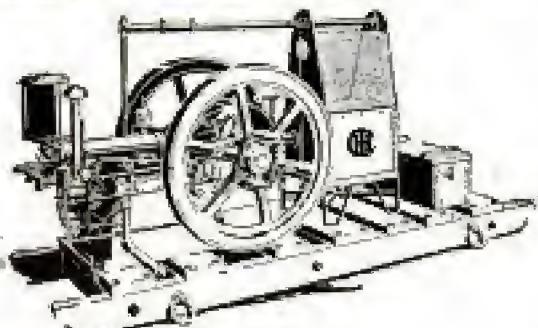
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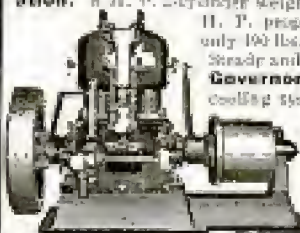
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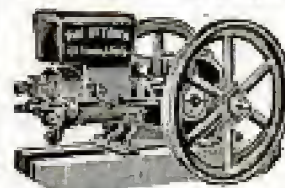
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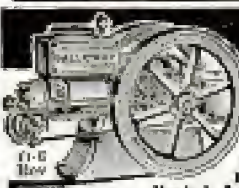
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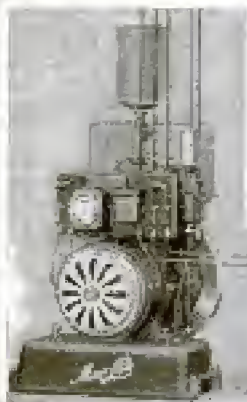
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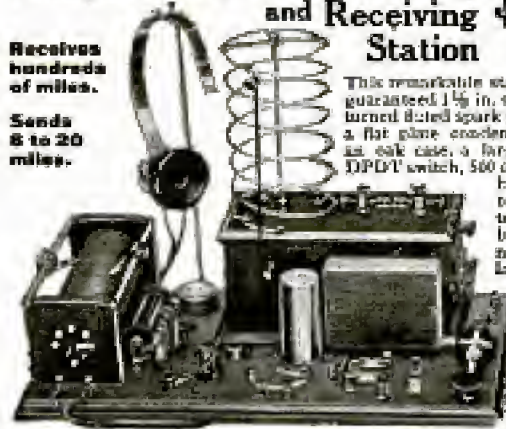
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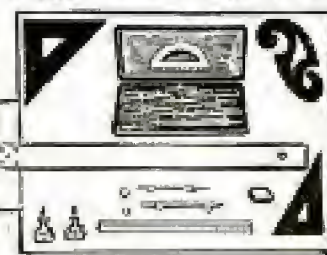
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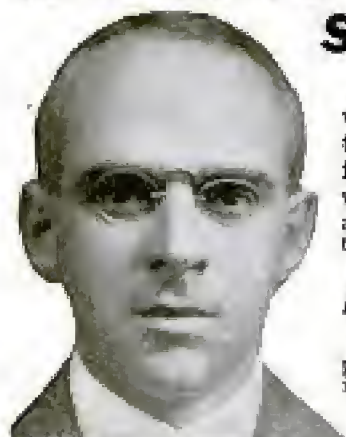


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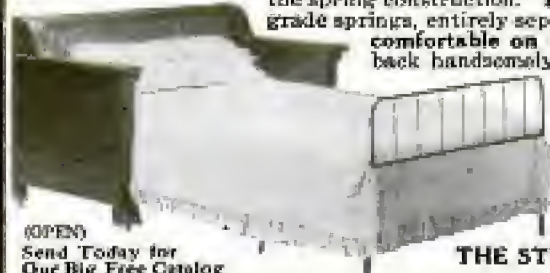
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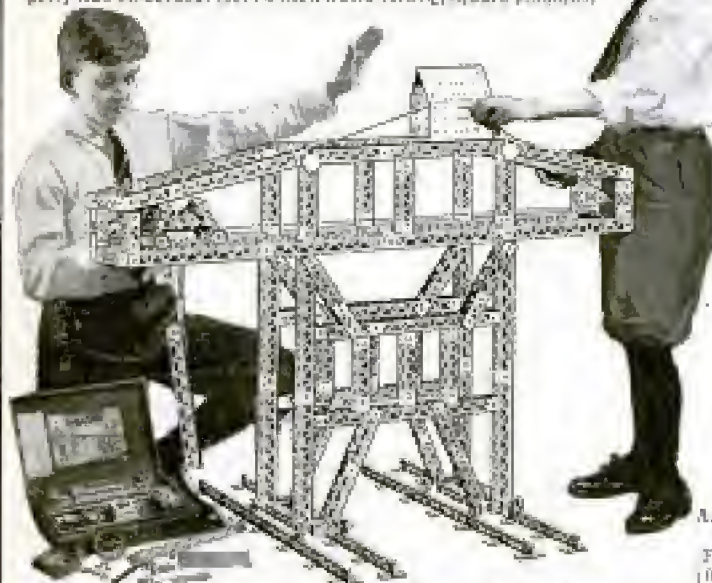
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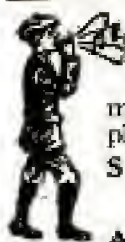


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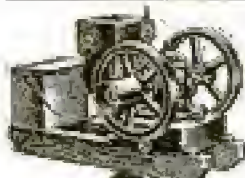
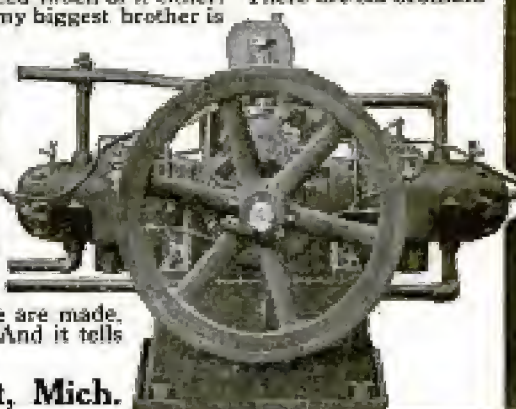
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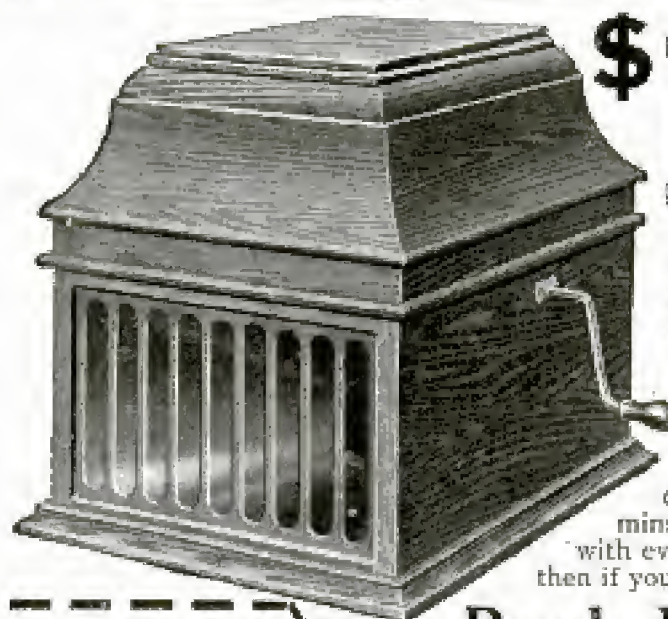
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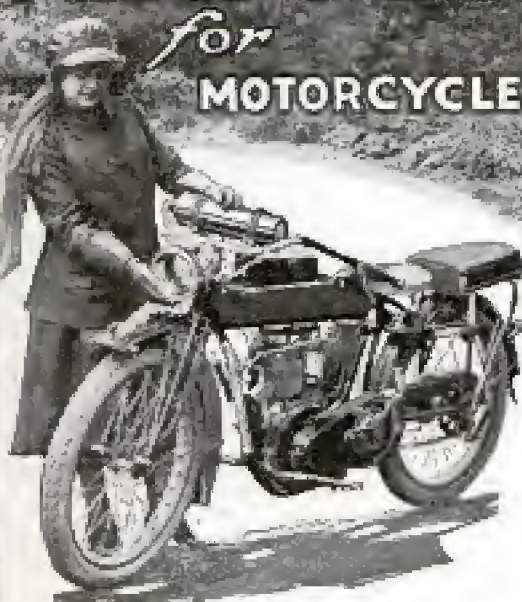
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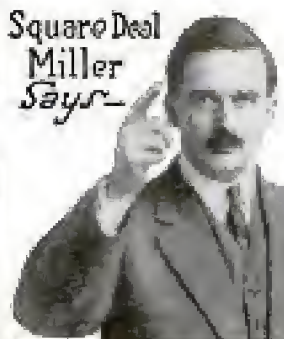
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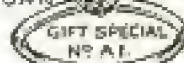


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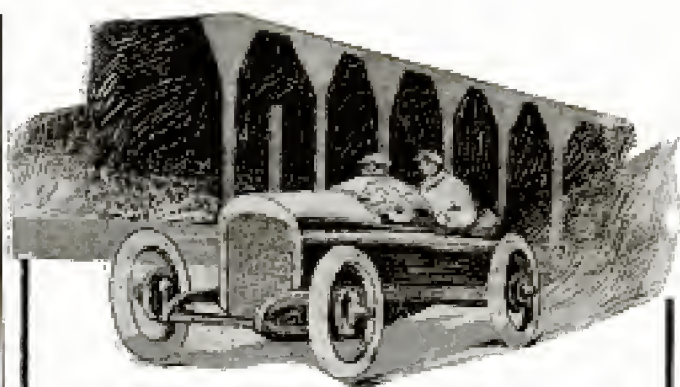
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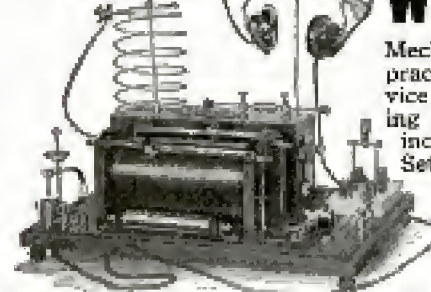
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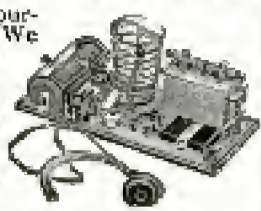
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Supply gasoline under pressure through hollow wire to lamps all over the house, and to gasoline stove. Our system is absolutely safe.

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Over 15 Different Styles and Sizes

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Design, material and workmanship of the best.

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can be bought two in a package, with wiring material and directions, all ready to attach to your present bell or buzzer wires.

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Inquire of your electrical dealer, or send check or money order for \$8.75 to our Department 55-AW for one of these outfits.

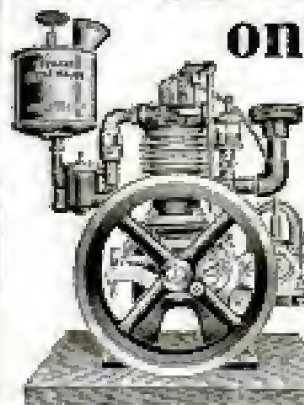
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Clearly"**

Mr. Garrett Browne (photo above) is but one of the 200,000 deaf people whom the Acousticon has enabled to hear clearly and usefully. This makes us feel so certain of its efficiency, that we will gladly send to every deaf person, simply on request, our new

1916 ACOUSTICON FOR FREE TRIAL

No Deposit—No Expense

Just say that you are deaf and will try the Acousticon, and the trial will not cost you one cent, as we even pay delivery charges.

WARNING! There is no good reason why everyone should not make as liberal a trial offer as we do, so do not send money for any instrument for the deaf until you have tried it.

We most sincerely state that we do not want one cent of your money if you cannot hear; that's the reason we want you to try the Acousticon first and convince yourself—you alone to decide. Just write today for your absolutely free trial and interesting particulars.

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30 Days FREE TRIAL

and freight prepaid on the new 1916 "RANGER" bicycle. Write at once and get our big catalog and special offers before buying.

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Turns night into day, 300 candle power. Carry as a lantern—use anywhere as a lamp. Weather proof. Heretofore unobtainable. For house, barn, garage, camp and around the farm. Write for big free offer. Special opportunity to farmers, stockmen and motorists. Agents make big money. **Write tonight.**

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**A Steel
Saw Vise
That
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Used by thousands of carpenters and builders—needed wherever a saw is used.

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DEALERS: Write for our unusual proposition.
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"A Fenestra Booster"

"YOU can say for me that Fenestra Solid Steel Windows are ideal for garage construction. I find my men work faster and accomplish more with less effort in our new building than they did before. Our garage is evenly heated and the gas and smoke never bother us because of the excellent ventilation. The saving in light bills is considerable. I will be glad to recommend your sash for this type of building anywhere."

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SOLID STEEL WINDOWS
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as installed in his garage had all the advantages we said they had.

You will be just as enthusiastic as Mr. Defrees if you use fireproof Fenestra in the garage you are going to build. You can get these windows in standard sizes at the same price you would pay for wood sash.

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Standard FENESTRA horizontally pivoted. Ventilator operated by automatic gravity control and stay operator, equipped with external adjustable lant.

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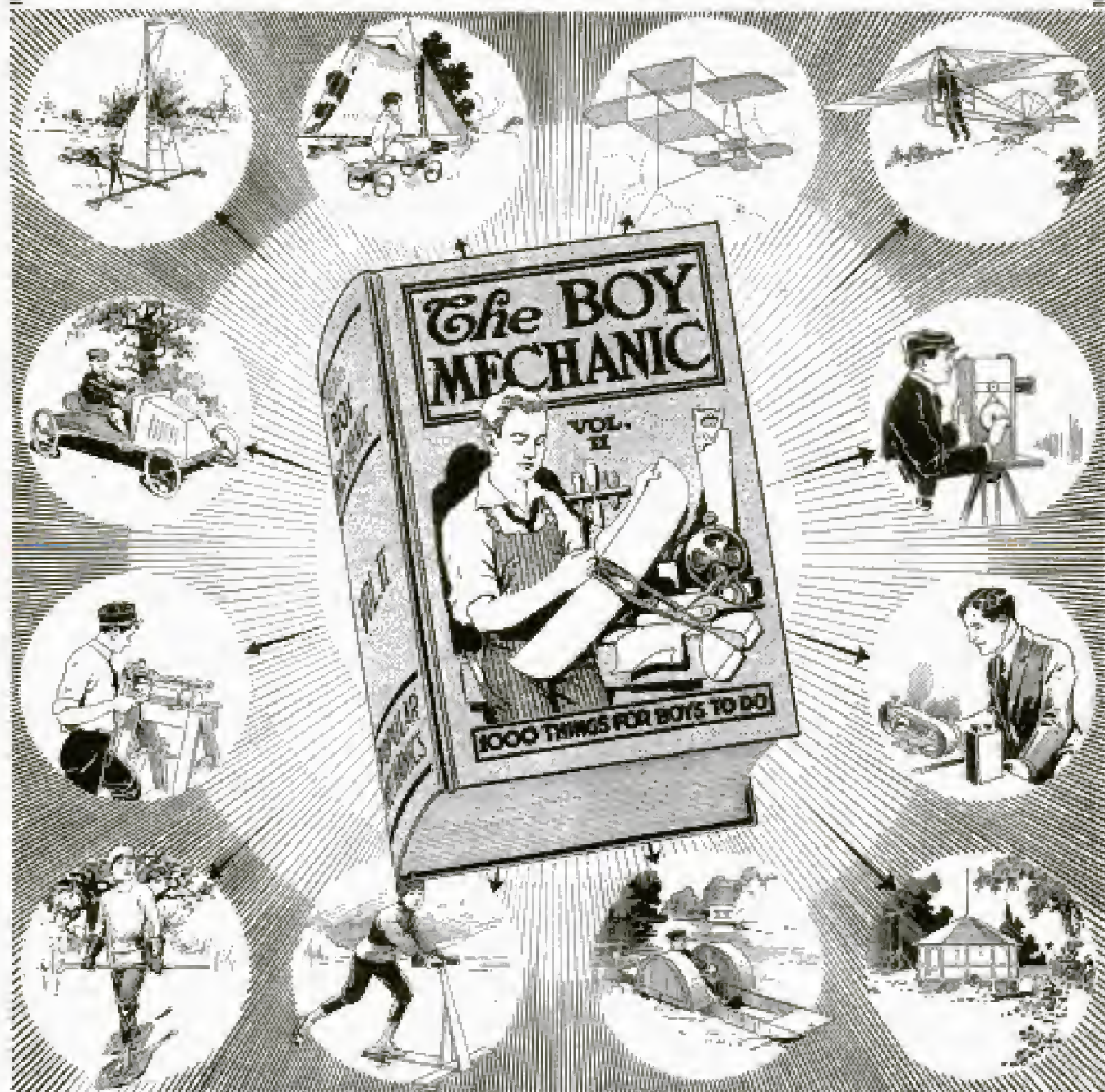
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In A Permanent
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A Business Like Mine—All of Your Own

Repair and Retread Auto Tires—No Experience Needed

Listen to this if you want **success, wealth and power**—if you have nerve, ambition and energy and are waiting for your opportunity to get into a big paying business of your own. I started in the tire repair business about six years ago. There were mighty few automobiles then as compared to today. The automobile industry just about got under way. **Your chances to win now are ten to one better than mine.** This is the biggest year in the automobile business. Stop working for others. Get into business for yourself. Get the big end of the money instead of the small. I will show you how to gain independence, happiness, riches, if you will write me at once,

Make \$3,000 This Year to Start

One Million New Autos to be Made. This Gives You the Chance

Think of it. One million new automobiles will be made in this country this year. One concern alone plans to make over half the entire country's production. There are now nearly 900,000 Ford's alone in use and they are being turned out at the rate of over 1,000 a day. Think what a chance this gives you in the tire repair business.

Punctures and Blow Outs Are Common

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at the biggest net profits to you. Retreading, vulcanizing and repairing of tires saves motorists money, so business comes easy. Old automobilists and the one million new automobilists will be eager to give you their business.

Tires to Mend the Whole Year Round

Autos are used both winter and summer. No seasons to tide over, without any work. Money comes in from one year's end to another, continually growing bigger and better, making you rich, prosperous and contented.

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are all complete in the finest detail. Nothing omitted to make them a winner. Experience is absolutely unnecessary. Just a little mechanical turn and follow directions is all that's required. The investment is small. **One machine will give you the start.** That's the way I did it. Business grows fast from this beginning. You will soon need another machine and then another. The first thing you know, you will be running a big shop—**You're a Real Manufacturer—and a Success.**

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There was never a better one for any man anywhere. Why not make the most of it while the chance is before you? **Why keep tied down,** shackled to the whims and purse strings of bosses? Why don't you hold the bag and make the big money? I built the business you see at the top of this page, the business I want to start you in. It's well worth your while to investigate. This coupon or post card will bring you complete information.

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Dear Sir:— You can send me your book and full particulars about your tire repairing device. This, of course, without any obligation on my part.

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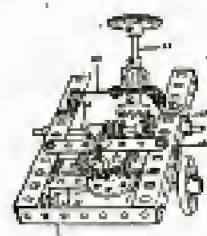


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These are the exclusive features that have won boys to STRUCTO. No other make can give them to you. STRUCTO gears, wheels and pulleys are die cast. They cannot get out of mesh and they run smoothly. The shafting is all key-seated—preventing slipping of gears. Then there are more parts and more sizes—all non-rusting. These are features you should demand. You can get them only in STRUCTO.



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Boys' dreams have at last come true—STRUCTO models work just like big machinery. With all STRUCTO outfits for five dollars or over you get a powerful electric motor free. It is equipped with standard shafting and gears, which are interchangeable to suit power and speed desired.

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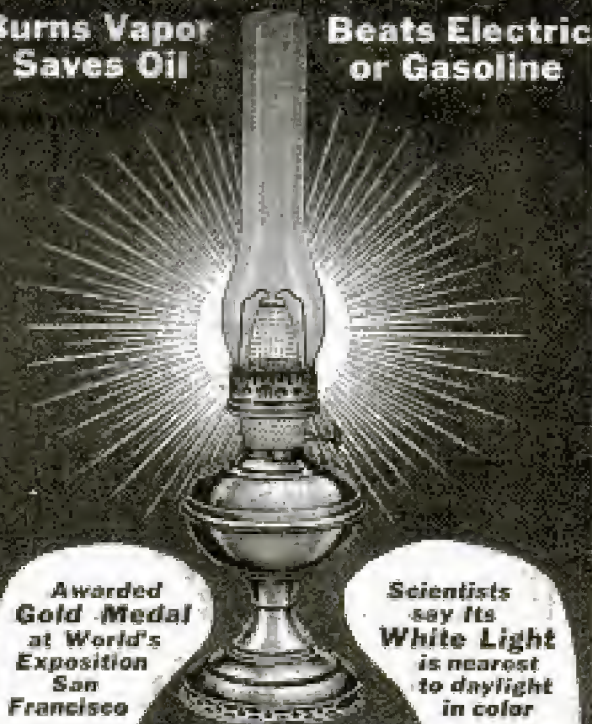
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Burns Vapor
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to the person who shows us an oil lamp equal to the new Aladdin (details of offer given in our circular.) Would we dare make such a challenge if there was the slightest doubt as to the merits of the Aladdin?

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We want one user in each locality to whom we can refer customers. Be the first and get our special introductory offer, under which you get your own lamp free for showing it to a few neighbors and sending in their orders. Write quick for our 10-Day Absolutely Free Trial. Just say, "Show me how I can get a strong white light from kerosene oil, without risking a cent." Address nearest office.

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Largest Kerosene (Coal Oil) Mantle Lamp House in the World
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EDISON DAY

OCTOBER 21st

Edison's Dream Comes True



In Millions of Homes, the Country O'er

—the fullest appreciation of Edison's invention of the incandescent lamp is now based on the bright, white brilliance of its successor of the present day —the EDISON MAZDA LAMP.

Three times as economical to operate as your old-style carbon lamps, your greatest saving comes when you put EDISON MAZDAS in every socket.

Make your home radiant with the three times greater brilliance of EDISON MAZDA. Your lighting company or nearest Edison agent will gladly help you choose sizes best suited to your needs.

EDISON DAY—October 21st—is the 35th anniversary of the invention of the incandescent lamp. Thirty-six years' experience in lamp making is summed up in the EDISON MAZDA LAMP of today.

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Tell Your Storekeeper
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TELL him how hundreds of high class stores now have this sensational Butter-Kist Pop Corn Machine.

Folks stand spellbound and watch the miraculous way it runs itself.

Look for the Butter-Kist Popper in your neighborhood. See how it feeds the raw corn from the hopper; watch the kernels swell, jump and burst into big, fluffy white flakes—crisp, crackling and clean—untouched by hands and piping hot! See how this marvelous machine butters each morsel evenly with pure creamery butter—more dexterous than human fingers. You never tasted such a tantalizing treat as BUTTER-KIST. Folks walk blocks to get it.

MERCHANTS! Net Profits Up to \$3120 Yearly, Many Actually More

This beautiful BUTTER-KIST Corn Popper is reaping a year-round harvest of spot-cash sales for high class department, drug and fruit stores, picture theatres, restaurants, cigar stands, etc. Brings new customers—increases store profits.

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Superbly Built—Runs Itself

No stick in carry—no watching. Stands anywhere—occupies only 20x32 inches—just move a chair and you have room for 14.

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This valuable new book gives facts, photographs, figures that prove profits, and full details. Sent free, postpaid. Write at once—every day gained means big money to you.

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What Do You Know About Your Car?

Can you make the repairs that save little bills now, big bills later on? Can you get everything out of your car that the manufacturer put in it? Do you know how to cut your tire cost by taking care of your tires?

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The only one of its kind. Note wheel in holder! Sets blade always at proper angle. Simple, Easy to use. Sharpens any safety razor blade.

GUARANTEED. Will last a lifetime. Highest Awards at Panama-Pacific Exposition. Complete nickel plated holder, holder's base and strap in new case, \$1.00. Money back if dissatisfied.

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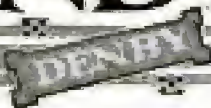
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this month carries on the great continued story of the world war and the world movement. More than 200 cartoons representing public opinion in the United States, Great Britain, Germany, France, Japan, Spain and Italy, with editorial comment from the most authoritative sources, make a fascinating chapter of History.

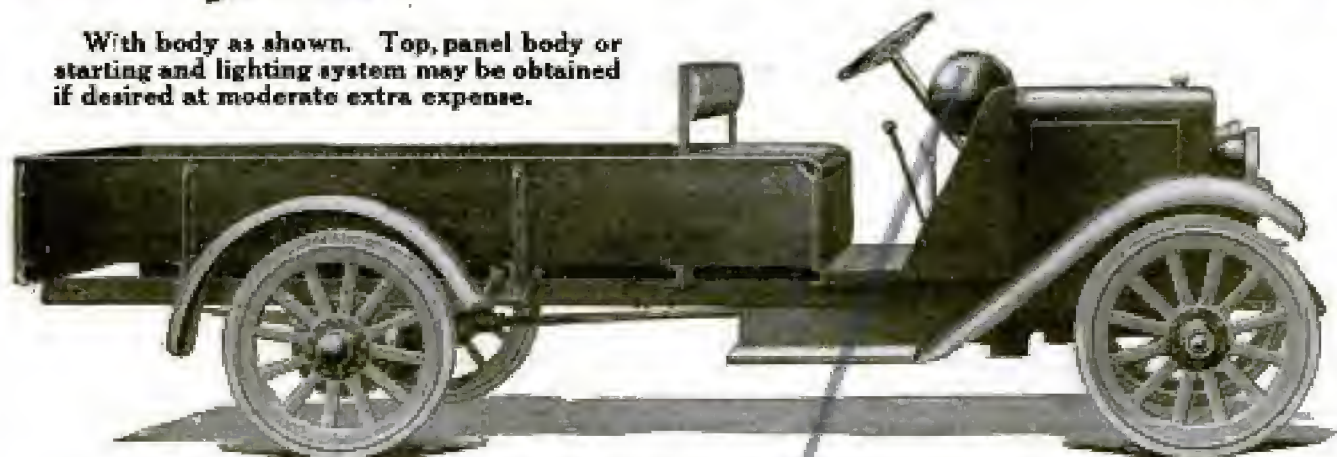
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With body as shown. Top, panel body or starting and lighting system may be obtained if desired at moderate extra expense.



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The growth of ninety per cent of the smaller business establishments is directly restricted by the limited field they are able to serve. Motor-haulage will increase the size of their "neighborhood." But they must be equipped to take full advantage of it in a sales sense. That is why we are announcing in connection with latest Denby model,

The Denby Business-Building and Sales-Efficiency Service

What It Is

This service—an exclusive Denby feature—embodies a year's course, under the direction of experts, in everything that has to do with increasing sales, adding new customers, building business.

There are thirty-six lessons, divided into quarterly periods of nine lessons each. The best experts obtainable have been employed in their preparation.

The driver of the truck—the man who comes in closest contact with customers, and who sees many that seldom come to the store—is the logical person to take the course.

But it is *free* to any person nominated by the owner of a Denby truck. And it means an efficient salesman added to your force.

\$3000 in Rewards

We have appropriated \$3000 to be awarded to the students who show progress. \$1000 of this will be paid November 1, 1915, to the person who has exhibited the greatest aptitude, whether he shall have taken the whole course at that time, or only part of it.

\$2000 additional will be paid in subsidiary awards during the year.

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GARVIN DENBY,
President, Denby Motor Truck Company
J. WALTER DRAKE,
President, Hupp Motor Car Company
CARL S. VON POETTGEN,
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The larger units maintain the supremacy which, in little over a year, have placed the Denby in the front rank of commercial motor-vehicles, and have made necessary the purchase of a greatly enlarged factory.

The internal-gear axle—which has made obsolete all other forms of drive—is a feature of all models.

Denby trucks are built by a thoroughly experienced organization with years of success behind it.

The prices of the larger units are:


Type B—1-ton . . .	\$1475
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Type E—2 tons . . .	1985

Write for particulars of the type you are interested in, and of the exclusive Denby service that helps to solve the problem of "making it pay."

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The Roof that Stays and Pays!

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THERE'S one roof the elements can't get the better of—one roof that won't fly off or wear out in a hurry—one roof that stays and PAYS. It is an

EDWARDS Metal Roof

Cuts loss in the first place. Easier to lay than a wood shingle roof—a man with hammer does it all. Lasts five times as long. Always tight—thanks to the patented interlocking device and "Tightcoat" process. No raw edges. No spots to rust or rot. Each sheet completely dipped in molten metal. Covers all edges as well as sides.

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DELIVERED FREE ON APPROVAL and 30 days' trial. No expense to you if you do not wish to keep it. **LOW FACTORY COST**, great improvements and values never before equalled in our 1914 models.

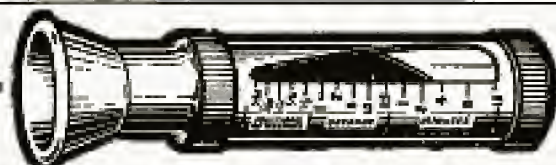
WRITE TODAY for our big catalog showing our complete line of 1915 bicycles, TIRES, sundries and parts, and learn the wonderful new offers and terms we will give you. Auto and Motorcycle Supplies at factory to user prices. Do not buy until you know what we can do for you.

MEAD CYCLE CO. DEPT. 6101 CHICAGO

NEW TOP for \$10 Your Old Ford \$10

Make your Ford look like new by putting our Slip Roof (built over the old top frame). This mat consists of new rubber roof, back curtains, back stays and quarters. Furnished complete with ladders, etc., ever put on and guaranteed to fit. **One-Man Mohair Top \$25.** Ford touring cars. **Ask your wire wiring.**

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Do You Photograph? The TRILUX Exposure Meter

tells instantly, accurately and easily the correct time for all exposures indoors and out

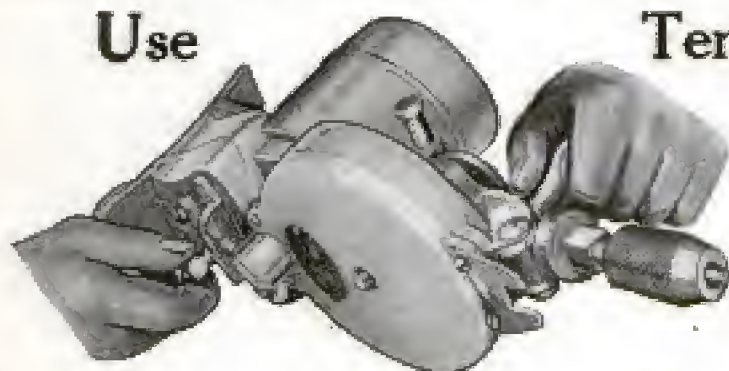
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for drilling in iron, steel or wood, tapping, sharpening tools, reamers, cutters and grinding dies and lathe centers.

Get Quick Results and Double Efficiency

Do away with that tiring hand work. Temco Tools cost but little while operating and stop all expense when not in use. Carry them anywhere in the shop or factory. Connect them to your drop light and you have the most modern equipment—equipment that saves you time and labor and brings quick results.

Compact in Design—Easy to Operate

An operator will appreciate a handy tool like Model B Drill. The weight is so well distributed and it is so compact in design that the drill is well balanced when held in the hands. Easy to operate because the switch is always accessible, right where you want it—near the handle. You do not have to release your hold on the drill to start, stop or reverse the motor.

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No matter whether the motor is running at full speed or not—it instantly reverses. The same switch starts, stops and reverses the motor and is always under your thumb when you hold the drill naturally for work. The Motor will not burn out.

Let us show you how a Temco Tool will take care of your needs. We have different models for varied requirements. Ask your dealer for a catalog on Temco Tools. Study the advantages offered. Apply the features to your particular work.

If your dealer cannot supply you with Temco Tools or literature, write direct to the factory and we will see you are supplied.

The Temco Electric Motor Company

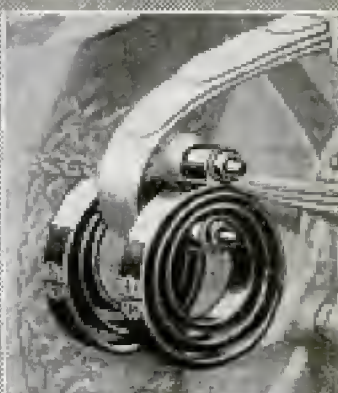
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The Picture of Health

And they used to be so thin, underweight, pale and tired looking. Now they are plump, properly proportioned, contented, capable and resourceful—their bodies well nourished and clothed with the proper amount of solid, healthy flesh.

A good physique can only come from health, properly fortified by a normal, natural supply of firm flesh and muscular tissue.

A product like Sargol for the needs of people who are thin, underweight and undeveloped is necessary. It will not of itself make fat, but mixes with the food you eat for the purpose of preparing the fats, sugars, starches and muscle building protein of your meals into a rich, ripe, flesh and weight producing condition that your blood can readily assimilate and distribute throughout your body.

SARGOL

works on the theory that most of the fat and tissue building elements of food pass through the thin person's body as waste. That to stop this waste and encourage proper food assimilation means the creation of millions of new flesh-forming cells and the rounding out and developing of the body to proper, normal weight and proportions.

Sargol either will or will not increase *your* weight and the only way you can ever know is to try it.

Let Us Prove What Sargol Can Do For You

Let us send you a regular 50-cent package of Sargol free for your own use. Take one tiny tablet with every meal and watch results. With the package we will send you valuable information on the nutrition and assimilation of food and the testimony of many who report successful use of Sargol. Address

THE SARGOL COMPANY

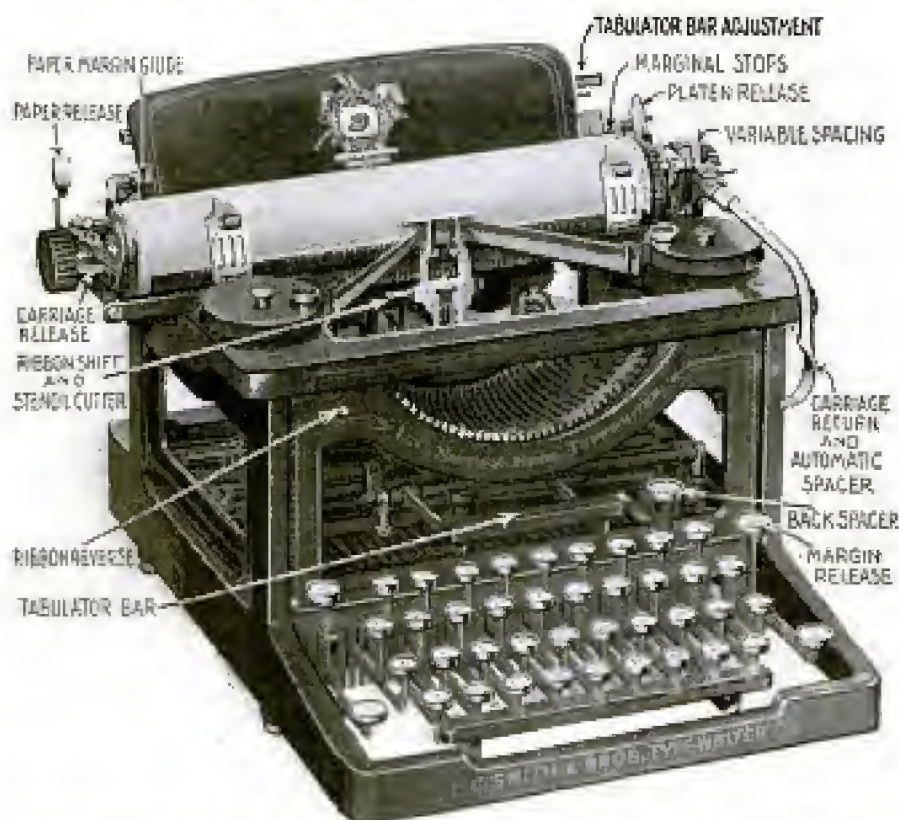
849-K HERALD BUILDING

BINGHAMTON, N. Y.

WHAT YOU SHOULD WEIGH

The following table of Normal Weights for both men and women will enable you to decide how badly you fall beneath the average that proper development demands.

Height	Men	Women
5 ft. 0 in.	121	113
5 ft. 1 in.	124	116
5 ft. 2 in.	129	121
5 ft. 3 in.	135	127
5 ft. 4 in.	139	131
5 ft. 5 in.	145	138
5 ft. 6 in.	149	141
5 ft. 7 in.	156	148
5 ft. 8 in.	161	153
5 ft. 9 in.	166	158
5 ft. 10 in.	171	163
5 ft. 11 in.	176	168
6 ft.	182	174



TYPEWRITER SENSATION

Free TRIAL—Use As You Pay

Only \$2.50 a month until the low total price of \$48.80 is paid, and the machine is yours

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay \$2.50 a month and own one. Think of it—Buying a \$100.00 machine for \$48.80. Cash price, \$45.45. Never before has anything like this been attempted.

Standard Visible L. C. Smith

Perfect machines, not damaged or shop worn. Standard size. Keyboard of Standard Universal arrangement writing 84 characters — universally used in teaching the touch system. The entire line of writing completely visible at all times, has the calculator, the two color ribbon with automatic reverse, the **Back Spacer**, Ball Bearing type bars, Ball Bearing shift action, the carriage runs on Ball Bearings, in fact every late style feature and modern operating convenience. Comes to you with everything complete, tools, cover, operating book and instructions, ribbon, practice paper—nothing extra to buy. You cannot imagine the perfection of this beautiful reconstructed Ball Bearing typewriter until you have seen it. I have sold several thousands of these perfect latest style Model No. 2 typewriters at this bargain price and every one of these thousands of satisfied customers had this beautiful, strictly up-to-date, visible, machine on five days' free trial, before deciding to buy it. I will send it to you **J. C. H. Chicago** for five days' free trial on receipt of your request, without obligation of any kind on your part to purchase. It will sell itself, but if you are not satisfied this is the greatest typewriter bargain you ever saw, you can return it at my expense — but — you won't want to return it after you try it — you cannot equal this wonderful value anywhere.

You Take No Risk—Put In Your Order Now

When the typewriter arrives deposit with the express agent \$8.80 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw, keep it and send me \$2.50 a month until our bargain price of \$48.80 is paid. If you don't want it, return it to the express agent, he will return your \$8.80 and return the typewriter to me. I will pay the return express charges. This machine is guaranteed just as if you paid \$100.00 for it. It is standard. Over one hundred thousand people own and use these typewriters and think them the best ever manufactured.

The supply at this price is very limited, the price will probably be raised when my next advertisement appears, so don't delay. Fill in the coupon today—mail to me—the typewriter will be shipped promptly. There is no red tape. I employ no solicitors—no collectors—no chattel mortgage. I deal direct with you — by mail only. It is simply understood that I retain title to the machine until the full \$48.80 is paid. You cannot lose. It is the greatest typewriter opportunity you will ever have.

Get the coupon in the mail today — sure

HARRY A. SMITH, 231 N. Fifth Ave., CHICAGO

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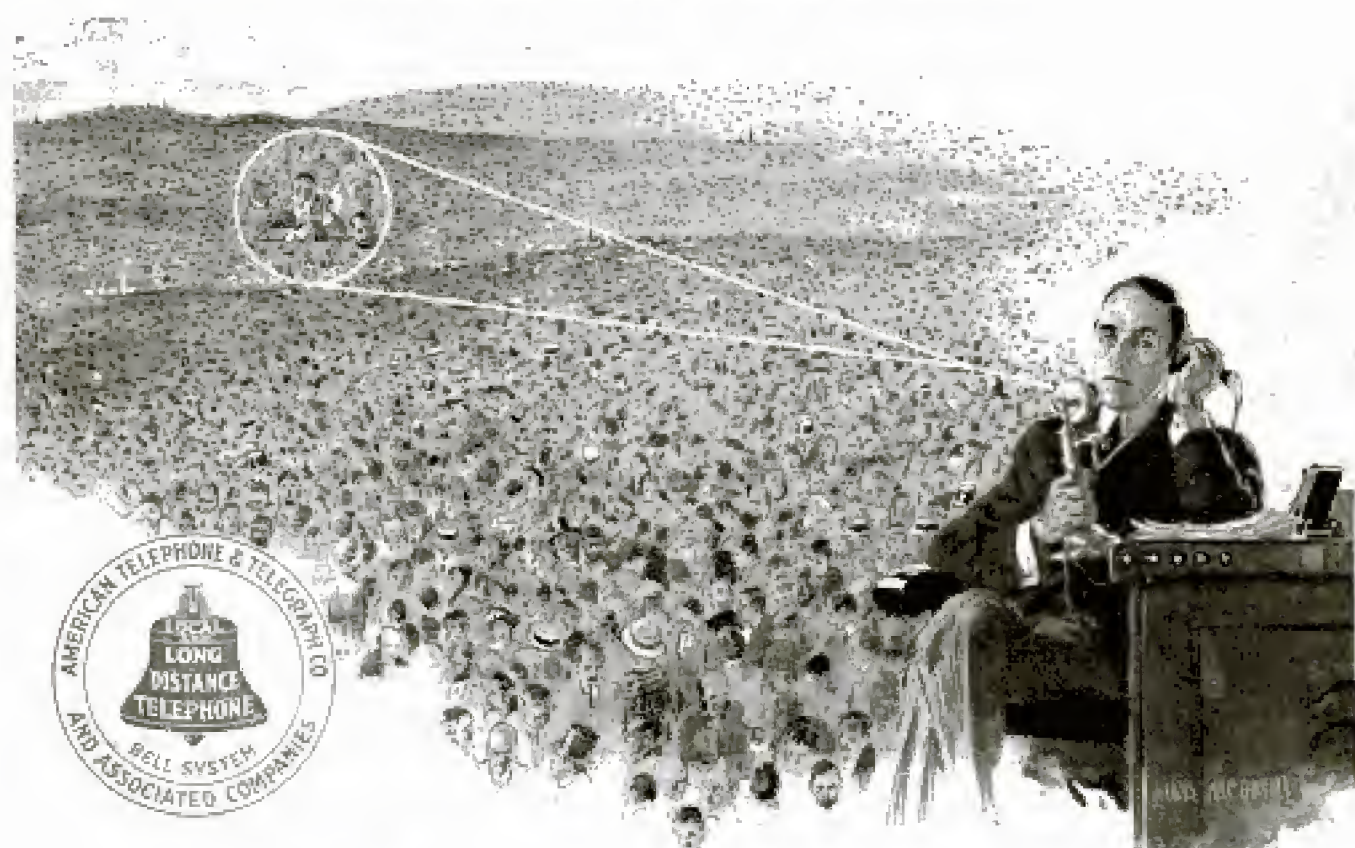
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CHICAGO, ILL.

Ship me a No. 2 L. C. Smith F. O. D. Chicago, as described in this advertisement. I will pay you the \$40.00 balance of the SPECIAL \$48.80 purchase price, at the rate of \$2.50 per month. The title to remain in you until fully paid for. It is understood that I have five days in which to examine and try the typewriter. If I choose not to keep it I will carefully re-pack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name

Address

Pop. Mech. Oct.



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That the human voice may be transmitted across our continent by telephone is the marvel of this age of wonders. Yet the full significance of the achievement is not realized if it is considered strictly as a coast-to-coast connection.

The Transcontinental Line not only bridges the country from east to west, but, by having finally overcome the great barrier of distance, it has removed the last limitation of telephone communication between all the people of the nation.

This means that the voice can be sent not only from New York to San Francisco, but from *anywhere* to *anywhere*—even from *any one* to *any one*—in the United States.

Wherever you are, it is possible to reach any one of our hundred million population. You can single out from this vast throng any particular individual with whom you desire to speak.

To bring this about, the Bell System has spent years and millions, extending its lines everywhere, anticipating the ultimate triumph. It has had the foresight and the courage to unite this great country, community by community, into one telephone neighborhood.

With success achieved by the Transcontinental Line, the established Bell highways make you, wherever you are, the near neighbor of your farthest-away fellow citizen.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

One Policy

One System

Universal Service

This is to Hail a Real Brunswick Home Billiard Table at \$27

Due to a Great Discovery—The Light-Weight, Ever-Level Astralite Billiard Bed

Rainy days, winter days, evenings after work is done—let the gay family gather round this scientific Carom and Pocket Billiard Table that you can set up in a jiffy or put aside when not in use.

For billiards is king of indoor sports—and nowadays reigns supreme in thousands of homes. A game brimming over with mirth and manly skill. It stirs the blood, sets old-age at a distance and makes your home the most enchanting place on earth for growing boys and girls!



**Brunswick Quick
Demountable Table With
Removable or Folding Legs**

Brunswick Home Carom and Pocket Billiard Tables are made of rare and beautiful woods. Not flimsy toys—but scientific tables with ever-level bed—accuracy! life! and speed!

The "GRAND," "BABY GRAND" and "CONVERTIBLE" Brunswicks have long been conceded the finest and fastest home tables in the world.

And now comes the Brunswick Quick Demountable—at \$27 upward—made by the same skilled men and methods. This table requires no spare room whatever. The demountable construction and the new sizes adapt it to fit in any home. No maker has ever produced one like it. The reason is this:

Astralite Bed—Monarch Cushion

The bed and the cushion are the two most vital parts of any billiard table. Genuine Vermont slate is used for the bed in all our other lines. This is far too heavy for a Demountable table, yet common wood billiard beds work loose and warp. Metal dents and rusts.

So our experts, after many trials, developed with the aid of science this new construction—called Astralite.

It combines light weight with the playing qualities of slate and the Brunswick Quick Demountable is the only table made that has it.

No other tables but Brunswicks have genuine Monarch Cushions, conceded by experts to be the liveliest and most durable known.

Playing Outfit FREE

No matter what size or style you select, we give a **high-class** Playing Outfit without extra cost—Balls, Cues, Rack, Markers, Spirit Level, Cue Clamps, Tips, expert book, "How to Play," etc.

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Our plan lets you try a Brunswick right in your own home for 30 days free! Then you can pay as you play—terms as low as \$5 down, 10 cents a day!

Full details, prices and tables all shown in our handsomely colored book, "Billiards—The Home Magnet." The coupon brings it postpaid free. Don't put off—send it NOW—while these valuable books last.

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The Holder-Top Stick—"You hold the Holder and the Holder holds the Stick"—is proving a signal success throughout the ranks of men who shave.

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